the OIL AND GAS JOURNAL

Bateman & Whitsitt
COMPLETE OIL WELL SERVICE
HOBBS, NEW MEXICO

January 15, 1952

Mr. Carl White, Jr., President
Franks Manufacturing Corporation
Tulsa, Oklahoma

Dear Mr. White:

We purchased new in March, 1947 a Franks Model 7000-TM mounted on an International K5-4 truck.

The operator in charge of this unit, Mr. Russel Small, has kept very accurate and detailed records on the equipment. I'm sure you will be interested to know that this unit from March, 1947 to November, 1951 pulled and ran 2,386,000 feet of tubing, which does not include many rod jobs and long line swab jobs. Since it is one of our heaviest units, it has been used mostly for 8,000 to 10,000 foot and deeper tubing jobs, many of them with double Kote strings.

Mr. Small reports during this time repairs for both the winch and truck engine were as follows: one head gasket, two universal joints, one set of drum chains and two power take-off chains.

After four years and five months the Franks winch was completely overhauled and put in almost new condition for $7,643.76. The truck engine, International RED-401, although it has never had the valves ground or the pan removed, is not using oil and shows no appreciable power loss.

Trouble-free operation plus the highest grade work for our customers has made this unit a very satisfactory one.

Yours very truly,

BATEMAN & WHITSITT

Frank Bateman

"TROUBLE-FREE OPERATION PLUS HIGHEST GRADE WORK FOR OUR CUSTOMERS HAS MADE THIS UNIT A VERY SATISFACTORY ONE"
Says: Frank Bateman

To facilitate faster delivery of servicing units to customers, Franks is now building "packaged" units, which will fit any standard truck of adequate capacity, on a continuous production line schedule. For your particular size and model unit contact your nearest Franks representative and have him enter your order or give you more detailed information.

FRANKS MFG CORP
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

PRICE 50 CENTS TABLE OF CONTENTS PAGE 71 APRIL 7, 1952

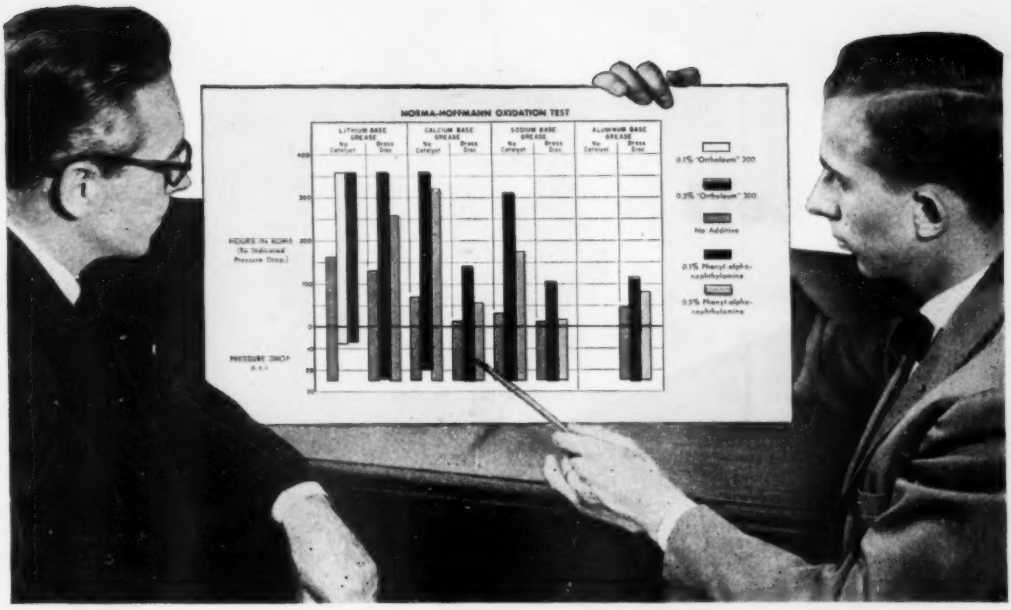
IT TAKES MORE THAN MUSCLE

Watching an athlete top a sports record, you feel a glow of admiration for the high degree of control and coordination which he has over his well trained muscles. And in oil well casing perforating, the same as in sports, it is the effectiveness of the techniques developed and the skill in applying them that get results. Welex Jet perforating, unlike the older methods which it is replacing, is not a method of violently upsetting an assembly in the well to permit the entry of oil. Rather it is *formation* perforating, which produces *through an intact assembly* with *positive hole density per foot* and *known penetration*. Results cost less with Welex Jets. Call your nearest Welex Station for prompt service day or night.

ORIGINATORS OF Welex JET PERFORATING

Welex
JET SERVICES INC.

GENERAL OFFICE: 3909 Hemphill Street • Fort Worth 9, Texas
FIELD STATIONS: Ardmore • Lindsay • Shawnee • Corpus Christi
Falfurrias • Houston • Kilgore • Odessa • Wichita Falls • Hobbs



YOUR CHOICE OF TWO DU PONT ADDITIVES FOR LOW-COST GREASE STABILIZATION

The demand for greater stability in greases is constantly increasing. This is due to the higher operating speeds and temperatures of modern equipment. To help you meet these conditions, and to increase the stability of your greases economically, Du Pont offers "Ortholeum" 300 and Phenyl-alpha-naphthylamine.

DU PONT "ORTHOLEUM" 300 supplies both antioxidant and metal deactivating properties. The result of this combination is outstanding where metal catalysis is a factor. On the other hand, "Ortholeum" 300 also shows marked superiority over Phenyl-alpha-naphthylamine in many non-catalyzed systems, as indicated in the Norma Hoffman comparison.

In many greases "Ortholeum" 300 provides high resistance to color deterioration, even under long exposure to light. It can either be added directly, or in an oil concentrate just prior to the final cooling period. For normal requirements, the treating cost of grease is under ½¢ per pound.

DU PONT PHENYL-ALPHA-NAPHTHYLAMINE gives excellent results in most non-catalyzed systems when the superior color stability of "Ortholeum" 300 is not essential. In equal concentrations, its lower price per pound means lower treating costs, too.

Since greases vary widely in their composition, their response to different stabilizers varies also, and the degree of stabilization required for different applications varies as well. Under the circumstances it will pay you to evaluate each of these two Du Pont additives in all of your greases —on the basis of quality as well as economy.

SAMPLES of "Ortholeum" 300 and Phenyl-alpha-naphthylamine are yours for the asking. Simply contact your Petroleum Chemicals Representative, or address your request to the Du Pont District Office nearest you.

DU PONT
REG. U.S. PAT. OFF.
Better Things for Better Living
. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • Wilmington 98, Delaware

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District Laboratories: Wilmington, Del. · Chicago, Ill. · Tulsa, Okla. · Houston, Texas · El Monte, Calif.

IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.—Calgary, Alta

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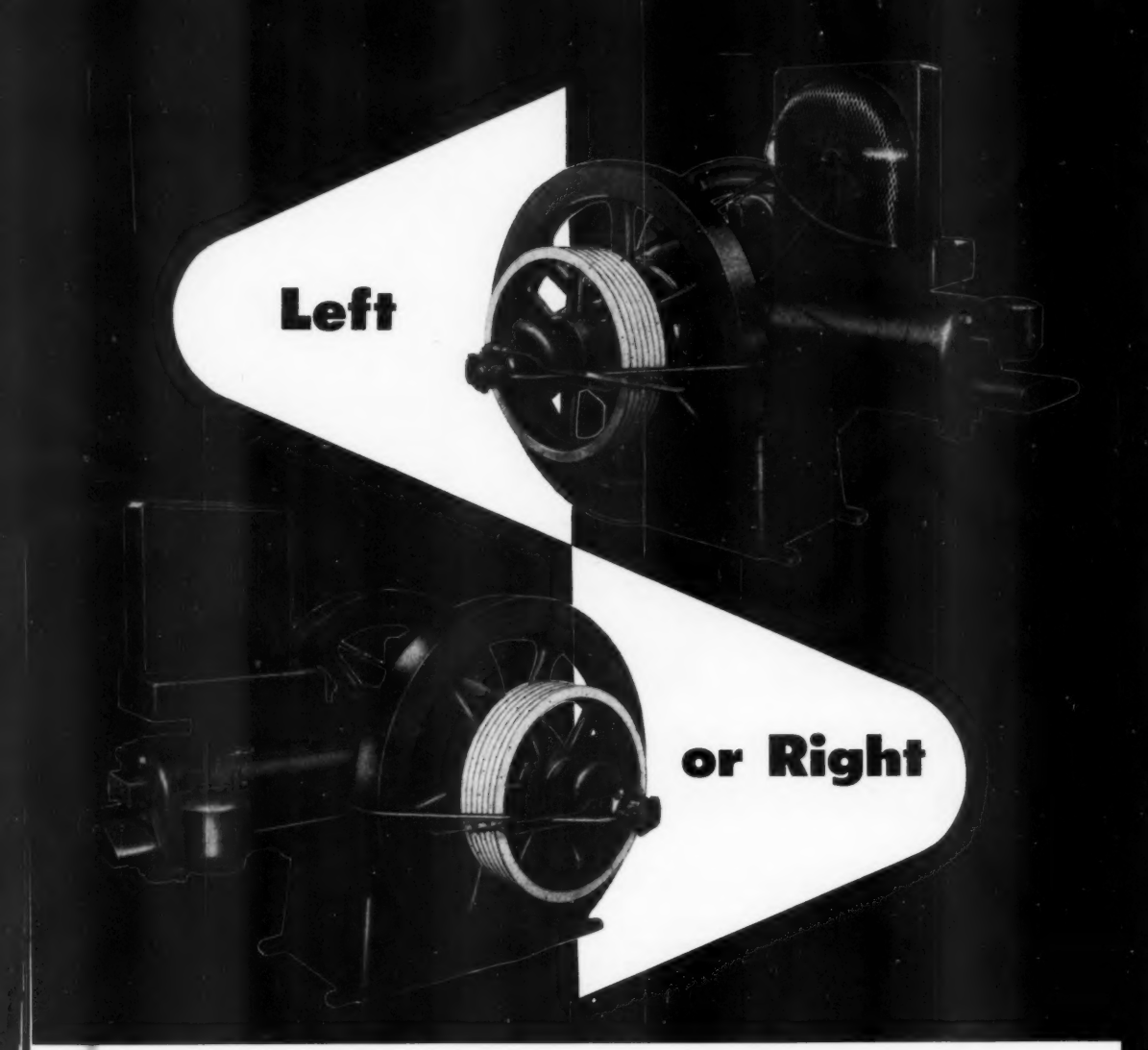


is right with the "ZC"

With a Fairbanks-Morse "ZC" Engine on your pumping rig, you can mount your clutch and sheave on either the *right* or *left* side of the engine. It's a big convenience feature that makes it easy for you to mount the engine where you want it on your pumping jack.

The TWO big flywheels of the "ZC" make this feature possible and give you the important flywheel effect on each side of the engine for smooth operation and economical performance.

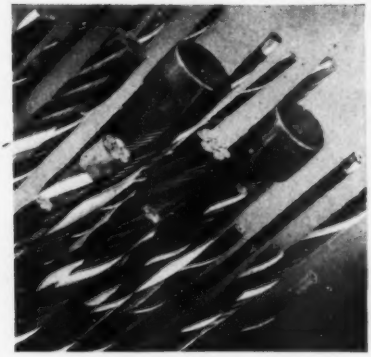
The Fairbanks-Morse Type "J" clutch and sheave assembly are ruggedly built units with extra heavy friction plates and contact parts to prevent distortion and assure uniform pressure at all times.

For the complete story on the "ZC" . . . *the engine with the big double wheels*, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE,
a name worth remembering

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

MACWHYTE



PREformed . . . Internally Lubricated

WIRE ROPE

for all equipment

From Macwhyte's complete line of a thousand and one sizes and types you get rope best suited to your equipment, designed, PREformed, and internally lubricated to provide long, safe service. (Catalog G-15.)

Wire Rope

SLINGS

for lifting and moving materials and equipment in production or maintenance.

There are hundreds of types and sizes of Macwhyte Flat-Braided, Round-Braided, Single-Part, and Grommet Slings. All are custom made in length, capacity, and flexibility to meet your needs. (Catalog S-8.)

Wire Rope

ASSEMBLIES

for machine parts, controls, and operating devices.

Macwhyte Safe-Lock wire rope assemblies are made to order in length, strength, and flexibility desired. Terminals are permanently attached to one or both ends. There are many standard types. (Catalog 5201.)

Macwhyte Company, 2916 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

Catalogs are available on request to Macwhyte Company or authorized distributor. 10165W

TULSA WINCHES
IN WORLD WIDE SERVICE

CANADA

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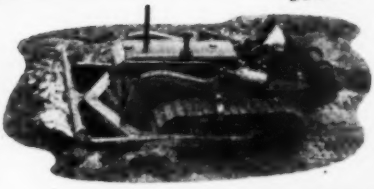
VENEZUELA

JAVA



HOLLAND

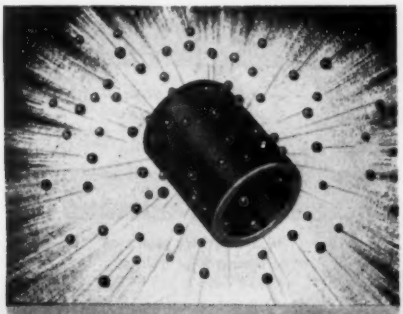
SWEDEN

Tulsa* Winch

TULSA, OKLAHOMA

DIVISION OF VICKERS Inc

How SHOT-PEENING Increases LINK-BELT Roller Chain Life

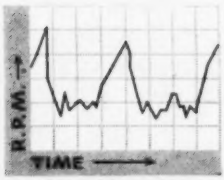


Thousands of tiny steel balls hammer the metal —cold work the surface of each roller— give it extra fatigue life and added ability to withstand shock and impact.

OIL FIELD SERVICE DEMANDS ...

VARIABLE LOADS

The high endurance limit of Link-Belt Roller Chain fits it perfectly to oil field conditions — where no-load to peak-load occurs almost instantaneously — and from zero to top speed and back again in a few seconds is typical of service requirements.



VARIABLE SPEEDS

Link-Belt rollers are strong and resilient, hard and tough—just the right combination for extra long service under repeated shock loads.

This combination is due to the selection of the right steel for the job, proper heat treatment, and the Link-Belt shot-peening process. Shot peening cold works the surface of the roller, making it hard and tough. It gives rollers the extra fatigue life needed to take repeated shock and impact loads. The result is a roller with high endurance level, durable under severe loads—a roller which helps make possible the high standard of performance every user expects and gets from Link-Belt Roller Chain.

12,000

LINK-BELT COMPANY: Indianapolis 6, Dallas 1, Houston 1, Los Angeles 33, New York 7. Distributors in all fields.

LINK-BELT

ROLLER CHAINS and SPROCKETS

Any ONE of these Reasons

is reason enough to always specify

American Iron *Straight Grip* TOOL JOINTS

Straight Grip TOOL JOINTS

— are 3 times as strong as the pipe they connect!

Straight Grip TOOL JOINTS

— give positive protection against joint leakage and creap!

Straight Grip TOOL JOINTS

— tighten their seal as the tension load and pump pressure increase!

Straight Grip TOOL JOINTS

— are precision machined and heat-treated to exacting specifications!

Straight Grip TOOL JOINTS

— are quickly and easily installed or removed at the drilling rig!

Straight Grip TOOL JOINTS

— require *no selective fitting* to the drill pipe!

Straight Grip TOOL JOINTS

— are designed right . . . made right . . . installed right . . . TRIED AND PROVEN!

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF OIL FIELD EQUIPMENT
A
REG. U.S. PAT. OFF.
OKLAHOMA CITY U.S.A.

4 POINT SEAL PROTECTION

The basic design of Straight Grip TOOL JOINTS provides the following 4 points of seal:

1. STABILIZER FLUID SEAL
2. THREAD TENSION SEAL
3. INSIDE FLUID SEAL
4. SHOULDER FLUID SEAL

Also manufacturers of A.P.I., "Amweld" (counterbore weld) and "Flash Welded" Tool Joints.

American Iron & Machine Works Co.

OKLAHOMA CITY, OKLAHOMA • BOX 1177 • PHONE L. D. 518

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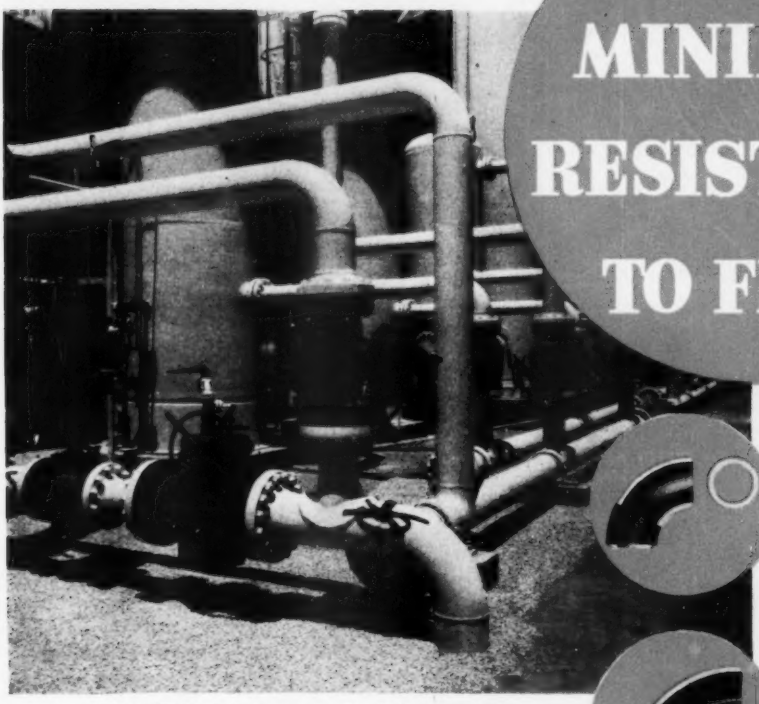
Grinnell Welding Fittings for

MINIMUM RESISTANCE TO FLOW



Grinnell Welding Fittings on towers of natural gasoline plant.

TRUE CIRCULAR SECTION

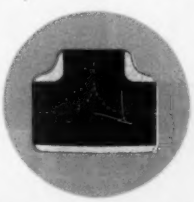
True circular section at all points makes a Grinnell fitting easy to align and weld . . . no distortion or flattening to affect flow adversely.

FULL EFFECTIVE RADIUS

Pressure loss through Grinnell welding elbows is held to a minimum because of the full, effective sweep of the radius.

SMOOTH, CLEAN INSIDE SURFACE

Grinnell fittings have uniformly smooth inner walls . . . no waves or ridges to cause turbulence or accelerate erosion or corrosion. No pockets to trap solids or foreign matter.



EASY, SWEEPING TURNS

In Grinnell welding tees, the corners where the outlet joins the run are well-rounded and perfectly smooth to minimize resistance to flow and to prevent trapping.

Any qualified welder can make welds quickly and easily with Grinnell welding fittings. These fittings are made by a hydraulic forging process that assures uniform wall thickness at all points and true circularity throughout. Of seamless, one-piece construction, they can be cut at any angle to match up with standard weight, extra strong and heavier wall pipe in I. D. or O. D. sizes. Pressure-temperature ratings are equal to or greater than those of seamless steel pipe. Grinnell welding fittings are process stress-relieved.

Full data on the complete line of Grinnell carbon steel butt welding fittings and forged steel flanges is contained in the Grinnell Welding Fittings Catalog.

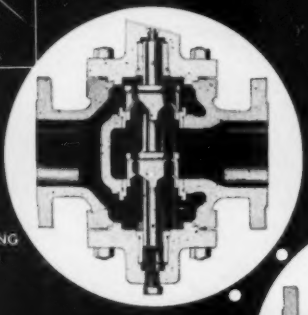
SEND FOR THIS CATALOG

GRINNELL

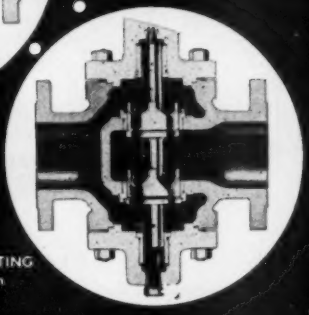
WHENEVER PIPING IS INVOLVED

Grinnell Company, Inc., Providence, R. I. Warehouses: Atlanta • Billings • Buffalo • Charlotte • Chicago • Cleveland Cranston • Denver • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland Philadelphia • Pocatello • Portland • Sacramento • St. Louis • St. Paul • San Francisco • Santa Barbara • Seattle • Spokane

QUICK SHIFT

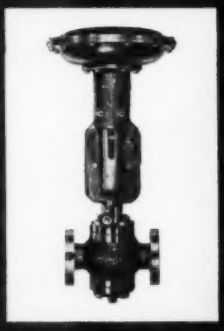


DIRECT ACTING
air to close



REVERSE ACTING
air to open

for easy field reversal of valve action

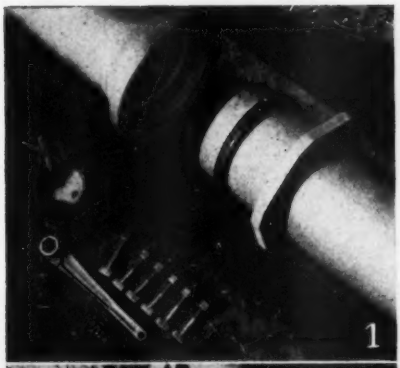


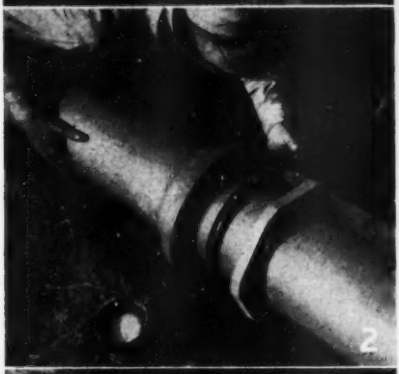
You can reverse the control action of the Honeywell Series 700 Valve by inverting the valve body and disc, and turning the travel indicator plate to its reverse side. It can be done in the field . . . easily and quickly, without extra parts or complex adjustments.
The Honeywell Series 700 wide band proportional control valve comes in a full range of styles and sizes . . . has *all* the features you look for in a fine valve. Write today for your copy of Bulletin 700-2.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division,* 1906 Windrim Avenue, Philadelphia 44, Pa.

MINNEAPOLIS
Honeywell
VALVE PRODUCTS

First in Controls





AMERICAN DOUBLE-X PIPE

Is Easily and Quickly Laid

Many large gas utilities have standardized on mechanical joint cast iron pipe for all types of gas at high pressures. The AMERICAN DOUBLE-X joint is the original standardized mechanical joint which was put on the market twenty-three years ago. Mono-Cast pipe with AMERICAN DOUBLE-X joints meets the exacting requirements of high pressure service.

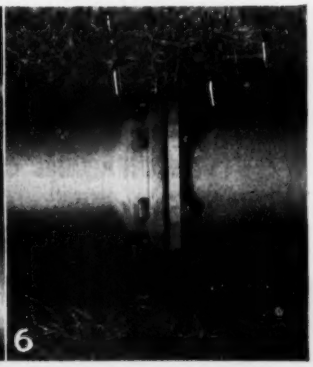
The accompanying pictures show clearly each of the progressive steps in making up the AMERICAN DOUBLE-X joint. Common labor can make up the joints rapidly and bottletight. In addition to a brush and a bucket of soapy water, only one tool—a ratchet wrench—is required. (1) Shows materials and tool necessary to make the joint. (2) Lubricant is being applied to the gasket. (3) Pushing gasket into position. (4) Inserting bolts. (5) Final tightening with wrench. (6) The completed joint.

A complete line of fittings for use with AMERICAN DOUBLE-X pipe is available, including transition pieces for inter-connecting with other types of joints and pipe.

Write for AMERICAN DOUBLE-X pipe and fittings booklet. A free copy will be sent on request.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM 2, ALABAMA



PARKERSBURG HYDROMATIC

. . . the finest, most efficient drawworks brake ever built.

And here's new evidence, by the industry itself, to support this fact. Hydromatic brake sales for 1951 were the highest in the history of the Company. That means more and more operators are turning to the Parkersburg Hydromatic for the dependability, safety and economy they need in a drawworks brake. It means, too, Hydromatic Brakes, through continuous development, are giving them more and more performance and operating advantages.

Here are a few of the recent developments that are keeping Parkersburg Hydromatic Brakes the finest ever built:

46" SUPER HYDROMATIC.

Delivers 30% more braking power than our 40" double rotor hydromatic. Has the power needed to meet the braking problems of 90% of today's deep drilling operations.

OVER-RUNNING CLUTCH.

Parkersburg's recently developed over-running clutch positively and automatically engages the brake as soon as the load starts to descend. Smoother engagement eliminates shock load on brake and rig. Decreases time required for round trips about 10%. Not a single mechanical failure reported during 2 years of testing in the field. Available from Parkersburg or can be installed by your drawworks manufacturer on your new rig. Adopted as optional equipment by two leading drawworks manufacturers.

SIZES FOR EVERY RIG . . . EVERY DEPTH.

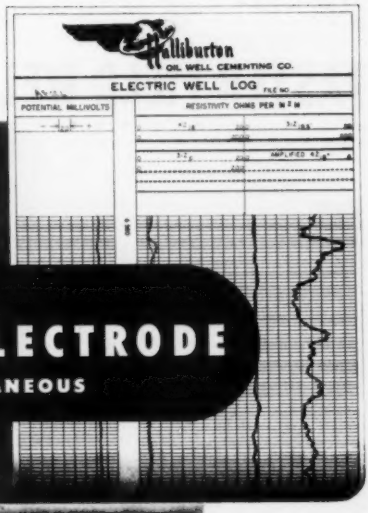
Available in 11 sizes, 15" through 60", you can get exactly the size of Hydromatic Brake you need for drilling to any depth up to 20,000 feet and more.

Write for newest Hydromatic Brake Catalog, HB-1-52. It contains complete information on the use and selection of Hydromatic Brakes, capacity charts for all sizes and other pertinent data about their installation and operation.

5203

PARKERSBURG
RIG & REEL COMPANY • Parkersburg, West Virginia

ELECTRICAL LOGGING *in one trip!*



with FM ELECTRODE

COMPLETE • ACCURATE • SIMULTANEOUS

YOUR CHOICE OF CURVES

A variety of electrode configurations have been developed. All Halliburton log headings carry a description of the curve, plus a schematic diagram of the electrode. Thus, $3_iZ9'$ means a three electrode arrangement with the current rings on the bottom and the pick-up ring on top, using a 9' spacing.

$2Z_{18''}$

A commonly used two electrode correlation curve with 18" spacing.

$4Z_{18''}$

A highly successful correlation curve, measuring accurate bed thickness, with no distortion top or bottom.

$3_iZ_{6'}$

A shallow-penetration three electrode type arrangement with the electrode log at the top of the section.

$3_iZ_{9'}$

A three electrode curve with 9' spacing. This curve or a $3_iZ_{6'}$ may be often used to measure R_i.

$3_iZ_{16'}$, $3_iZ_{18'}$, $3_iZ_{22.5'}$, or $3_iZ_{27'}$

Deep penetration three electrode curves with a possibility of 16', 18', 22.5' or 27' spacings.

$3_iZ_{13'}$

A 3_iZ curve capable of penetrating beyond the invaded zone.

You have available set combinations of these spacings most applicable to your area, with correlative curves that may be matched against any offset well.

New in principle but seasoned by successful years of logging, the Halliburton developed FM ELECTRODE – during one trip in the well – records all the electrical curves ordinarily required by three or four trips. Result – electronic accuracy with service three times faster.

FULLY AUTOMATIC Halliburton Equipment offers many advantages never available before in equipment of this type:

ALL VALUES ARE ABSOLUTE with reference to an absolute base zero. All lateral curves have identical reference points. Built-in calibration features enable the accuracy of a reading to be checked at any time. Tools may be calibrated in the hole on the job.

ONE SINGLE CONDUCTOR CABLE simultaneously transmits all electrical impulses, permits electric logging when the well is shut in under pressure. Minimum stretch assures greater depth accuracy. Line leakage can be entirely disregarded, since readings are frequency logged.

HALLIBURTON'S new, complete electric logging service with the new FM Electrode equipment is another advancement *ready now* for the oil industry. For further information phone your nearby Halliburton Representative . . . or write for Bulletin No. 32. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

Years Ahead In Electronic Logging

HALLIBURTON

FASTER FIELD WELDING MEANS FASTER, EASIER PIPE LAYING

WITH CF&I WELDED STEEL PIPE

Men who work in the field with CF&I Welded Steel Pipe will tell you it can't be beat for faster and easier field welding.

That's because every length of CF&I pipe is made of special highly weldable steel... hydraulically tested and expanded for uniform size and roundness... precision bevelled at the ends for easy and accurate fit.

CF&I Welded Steel Pipe is offered in lengths of 40 feet and in overall diameters from 24 inches through 36 inches. Write for complete information to Claymont Steel Corporation, Claymont, Delaware.

Flanged and Dished Heads . . . Carbon and Stainless-Clad Steel Plates

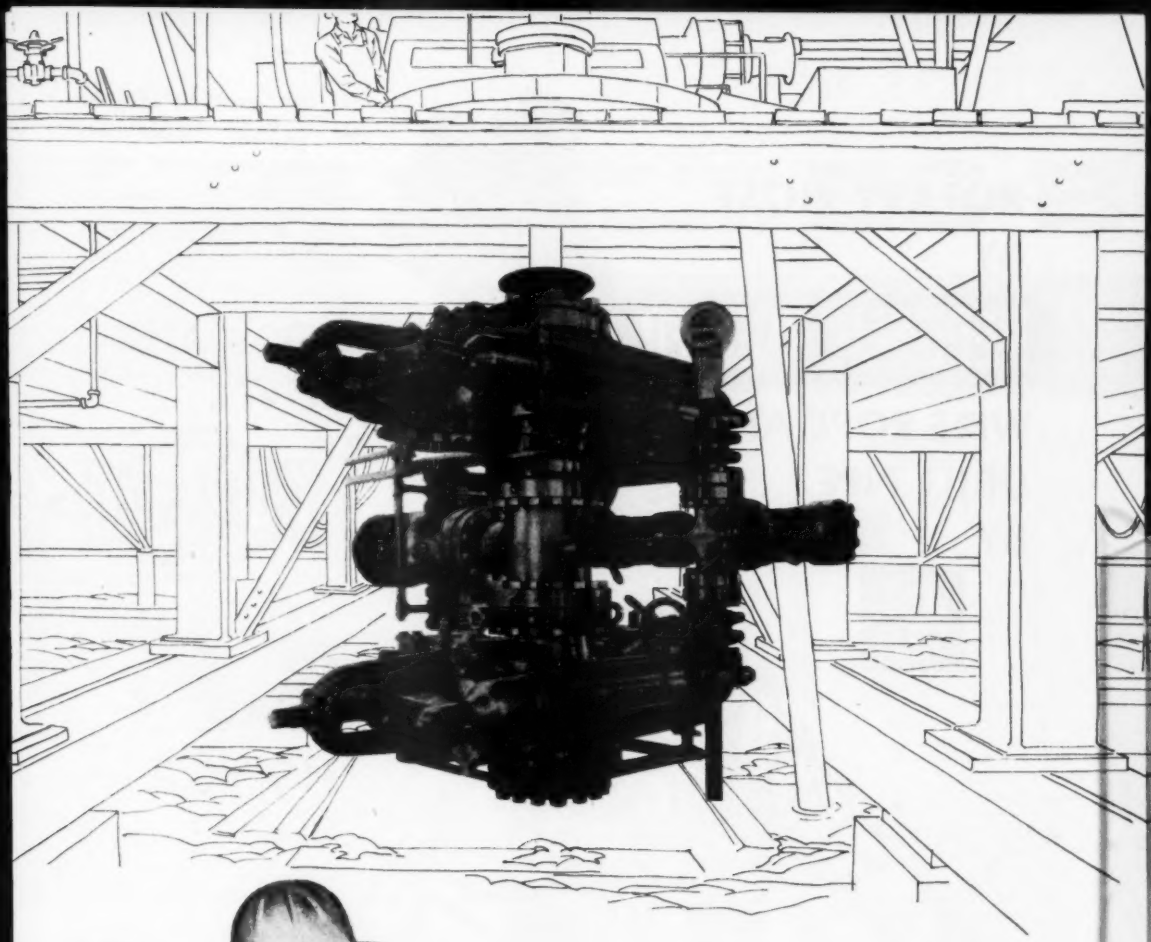
CF&I

WELDED STEEL PIPE

PRODUCT OF

CLAYMONT STEEL CORPORATION

SUBSIDIARY OF THE COLORADO FUEL AND IRON CORPORATION



"Those Camerons are the best insurance we've got!"

No other drilling control unit offers so much protection: Swift closure of rams, remote control operating valves within easy reach of the driller, self-feeding ram packing for a positive seal and to permit pipe rotation through closed rams; closing ratio of approximately 8 to 1 (well pressure vs. closing pressure), utilization of well pressure in helping close rams, and quick ram change design which permits changing of largest size rams in a matter of minutes.

Cameron Pressure-Operated Blowout Preventers and Flowline Valves *are your best insurance* against hazardous well pressures. Before starting a wildcat or a well in a proven high pressure area, be sure your drilling control units are of adequate capacity and modern design . . . be sure they're Camerons!

Cameron first name in drilling control

Cameron Iron Works, Inc.

P. O. Box 1212 Houston, Texas

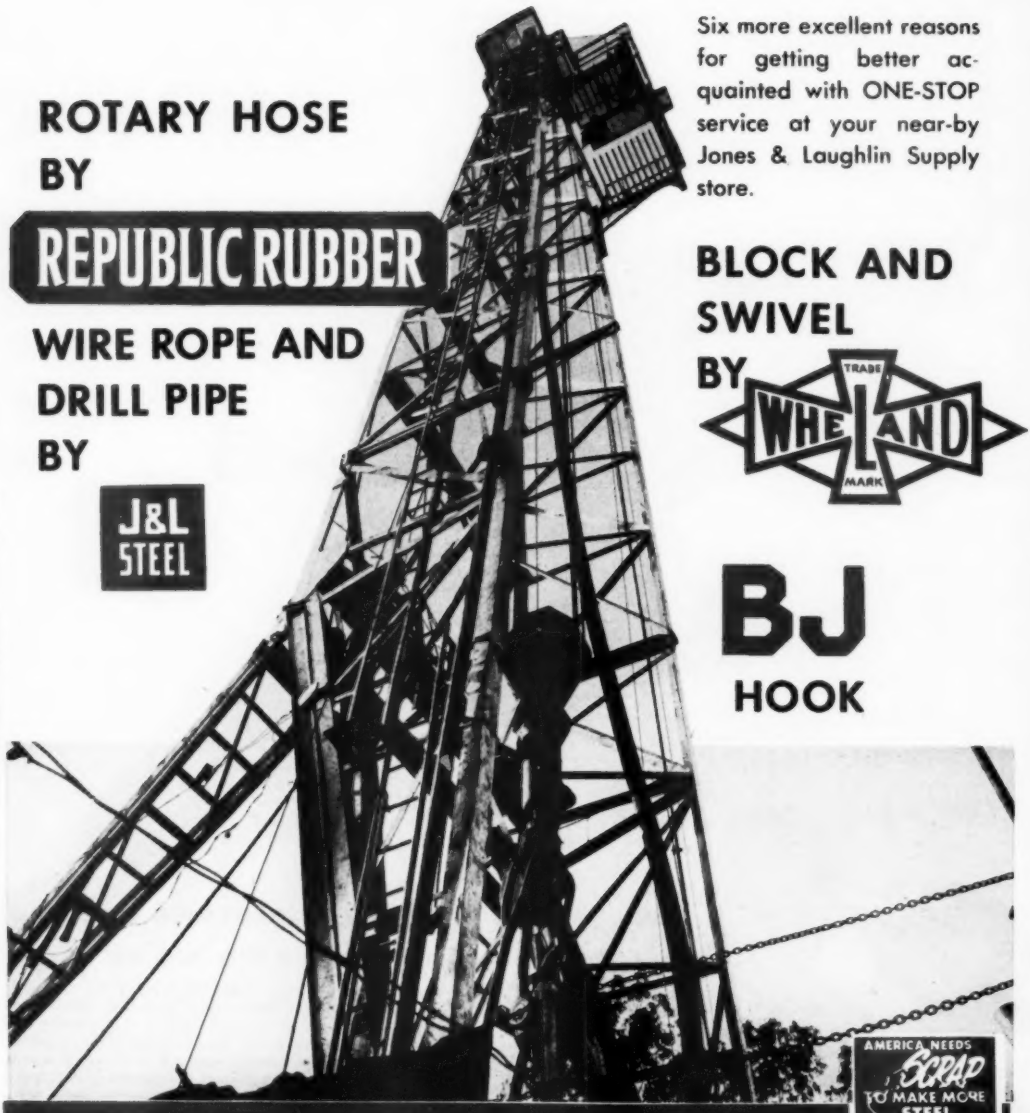
Export: 74 Trinity Place, New York, N. Y.
Represented in the sterling area by: British Oilfield Equipment Co., Ltd., Duke's Court, St. James's, London S.W.1, England.

ROTARY HOSE
BY
REPUBLIC RUBBER
WIRE ROPE AND
DRILL PIPE
BY
J&L STEEL

Six more excellent reasons for getting better acquainted with ONE-STOP service at your near-by Jones & Laughlin Supply store.

BLOCK AND
SWIVEL
BY
TRADE WHE L AND MARK

BJ
HOOK



Jones & Laughlin Supply Company

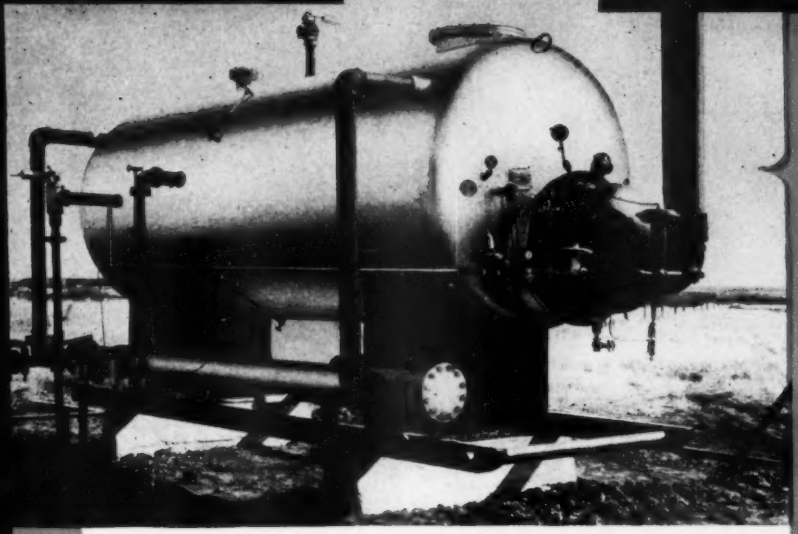
"... here's MY warehouse!"

EXPORT: 405 Lexington Avenue, New York, N. Y., U.S.A.
General Offices: TULSA, OKLAHOMA
84 STORES • 18 OFFICES • 8 RESIDENT SALESMEN

J&L STEEL
Subsidiary of
Jones & Laughlin
Steel Corporation

The only Horizontal Emulsion Treater* with a steam chest is manufactured by BS&B

Recognizing the need for a horizontal treater that will work, BS&B engineers came up with the answer in the Model HGT . . . field tested and accepted as a step in more efficient oil treating.



10 REASONS WHY A STEAM CHEST

A closed system requiring no make-up water . . . removable . . . built to A. S. M. E. requirements.

1. Eliminates the possibility of firebox burnouts.
2. Greater efficiency with direct heating of emulsion—no wasteful heating of wash water.
3. The settling section can be maintained at a constant temperature which allows better treating results with lower temperatures.
4. Larger oil settling space due to elimination of so-called "water wash", together with evenly maintained settling section temperatures, means higher capacities.
5. Lower temperatures and minimum heating of salt water will reduce corrosion.
6. Low "skin" temperatures on the steam chest minimize the chance of salt deposits and eliminates any possibility of "coking".
7. Expensive inspection of firebox is eliminated. Inspection for deposition on steam chest is necessary only when reduced heating capacity is observed. The steam chest cannot burn out.
8. Minimum heating of the salt water reduces troubles with deposits in siphons, water discharge valves, and water discharge lines.
9. Provides for convenient use of a steam preheater for situations involving badly foaming oil, severe paraffin conditions, etc.
10. High efficiency (70% overall thermal) immersion tube firebox operating safely in "distilled" water within the steam chest means less fuel gas consumed.

* Patents Pending

LARGE QUIET HORIZONTAL FREE WATER KNOCKOUT Horizontal flow offers a larger surface for separation of free water . . . which is removed without being heated, reducing heat load on the heating unit. Production enters the horizontal treater above the gas emulsion interface, allowing rapid separation of gas and reducing turbulence in the free water knockout section. Weirs control the oil-water and oil-gas interfaces. Hot gas produced in the **LARGE STEAM HEATING AND SETTLING SECTION** is mixed with cool gas from the free water knockout section, causing the heavier gas fractions to condense and be recovered in the oil . . . producing a higher gravity crude. A large filter bed aids in the final separation of the water and oil. Easily adjusted internal siphon controls the water level in the heating and settling section. The BS&B Horizontal Treater is portable when skid mounted. It's easily housed and insulated . . . controls conveniently grouped and located for piping and housing . . . each compartment can be drained separately without draining balance of heater.

BS&B Horizontal Emulsion Treater available for delivery...Sizes—6'x14'—6'x21'—8'x21'—10'x21'...Auxiliary Units available for attachment to the Treater at factory or in field with minimum of time and effort.

EFFICIENCY BS&B RELIABILITY

BLACK, SIVALLS & BRYSON, INC.

There's one of 35 BS&B Branches near you, if you're in the oil country . . . or write—
Oil & Gas Equipment Division, Department 1-A4
2131 Westwood Blvd., Oklahoma City, Oklahoma

Light-duty FWDs help you drill more holes per day

This new Model LD gives geophysical crews proper distribution of weight and power because it is a *true* four-wheel-drive!

SAFE TRANSPORT is furnished by the LD for geophysical equipment and supplies.

A DRILL RIG is carried by this LD for use wherever dynamite is to be planted.

THE LD USED AS A SHOOTING TRUCK, moves across rough terrain to exploration holes faster.

Exploration crews say, "Now we reach more locations under our own power — without winching." With power *factory engineered* into all four wheels, the light-duty Model LD pulls through deep mud and sand, climbs steep trails, pushes through underbrush . . . *gets over terrain on schedule.* FWD's proper distribution of weight and power is responsible for this superior performance over *conversions* and *conventional* trucks. For facts, ask an FWD distributor. The FOUR WHEEL DRIVE AUTO CO., Clintonville, Wis., Canadian factory: Kitchener, Ontario.

Built by the makers of America's Foremost Heavy-Duty Trucks

You buy more than a truck when you buy an FWD

Extra traction and proper distribution of weight and power help you:

- Travel where other trucks can't go
- Drill more holes per day—every day
- Keep contract schedules
- Avoid field breakdowns and down-time
- Get greater safety — on or off the road

World-Wide Sales and Service

D+B Quality Control Gives You a Better Sucker Rod!

500 MAGNIFICATION

All sucker rods look pretty much alike on the surface. It's when you look "inside" that you can see the difference.

D+B metallurgists use a metallograph, that magnifies a rod cross-section up to 1500 times, to get that "inside" view. This enables them to examine every detail of grain structure and determine the effect of forging, normalizing and drawing on each heat of steel.

This is only one of the many controls used to assure the uniform high quality and balanced mechanical properties of D+B sucker rods.

D+B and CONTINENTAL maintain sales and service facilities in virtually all major producing areas. Call your nearest D+B or CONTINENTAL store for quick service... anywhere, anytime.

D+B DIVISION
EMSCO DERRICK & EQUIPMENT COMPANY
Garland, Texas • LOS ANGELES, CALIF. • Houston, Texas

D+B
SUCKER RODS
& COUPLINGS

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"SERVING THE OIL AND GAS INDUSTRIES"

THE CONTINENTAL SUPPLY COMPANY, General Offices: DALLAS, TEXAS
Export Div.: The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N.Y.
The Continental Supply Company, Limited, 316 Lancaster Bldg., Calgary, Alberta

Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela

E 116F-52

D+B Armored Plungers cut your pump costs!

You get the advantage of low initial cost and long service when you install a D+B Armored Plunger in your pump.

Designed for abrasive service, D+B Armored Plungers are made of special alloy steel hardened by a patented process that gives them a hard wear-resistant case.

D+B Armored Plungers are precision-machined, ground and polished for smooth efficient operation. They are made in all sizes for rod and tubing liner pumps.

In addition to Armored Plungers, D+B makes a full range of chromium-plated and Endurall Plungers to meet any field condition.

For information about D+B precision-machined subsurface pumps and parts call CONTINENTAL or your nearest D+B store. The combined facilities of D+B and CONTINENTAL assure you fast, dependable service, wherever you are.

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CONTINENTAL

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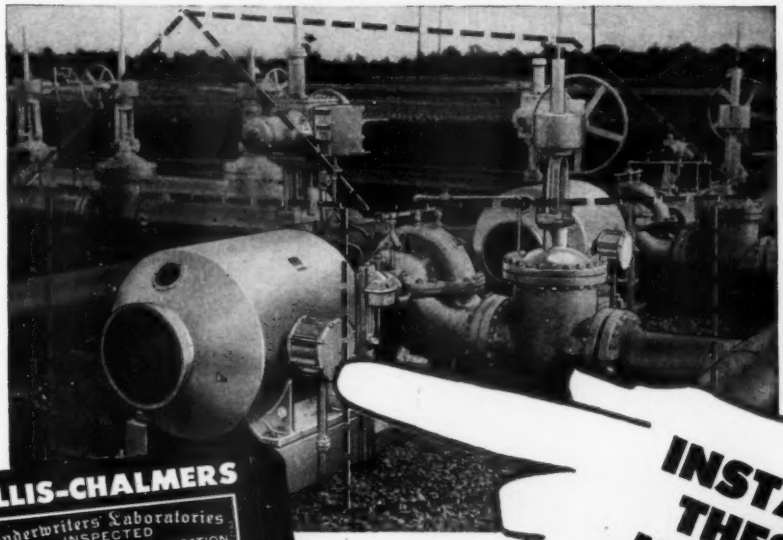
No building to buy!



INSTALL THESE MOTORS OUTDOORS

YOU CAN ELIMINATE costly building on many different kinds of installations by using Allis-Chalmers Tube-type, Explosion-proof Motors and installing them outdoors. The motors shown here operate outdoors all year round at a midwestern pipe line booster station. Rain, snow, dirt, the weather's worst conditions, do not affect their dependable operation. And the same kind of savings can be made in hundreds of other applications in the field, on pipe lines and in the refinery.

Self-Cleaning Feature Saves Maintenance

The cooling system in this unique motor is practically self-cleaning. Cooling air is blown through straight, smooth tubes at sufficient velocity to clean out ordinary dirt, even after long shutdowns. There are no corners or pockets to trap dirt or moisture. If sticky dirt clings, a ramrod will clean the tubes in seconds without stopping the motor.

On any type of duty, indoors or out, Allis-Chalmers Tube-type, Explosion-proof Motors reduce maintenance by keeping themselves clean. Get full details from your Allis-Chalmers Authorized Distributor or District Office. Or write Allis-Chalmers, Milwaukee 1, Wis., asking for bulletin 51B7149.

A-3696

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Best way to find more scrap

Steel scrap—needed to keep the nation's mills rolling—grows scarcer every day.

Unless more scrap is found and turned in, steel users—and therefore the preparedness program—will suffer.

You can do the most to improve the situation. And the best way, the proved way, is this: Use your *shoe leather*. Walk around your plant and property and look for every possible piece of iron and steel scrap.

Chances are you'll be surprised at the amount of old machinery and obsolete tools that can be recovered as scrap. Example: By looking around, one West Coast plant recently turned up 120 carloads of scrap—over 3300 tons. That's money in the till!

So start using your shoe leather *now*. Help get in the scrap that will mean more steel for you!

It's good business to do business with

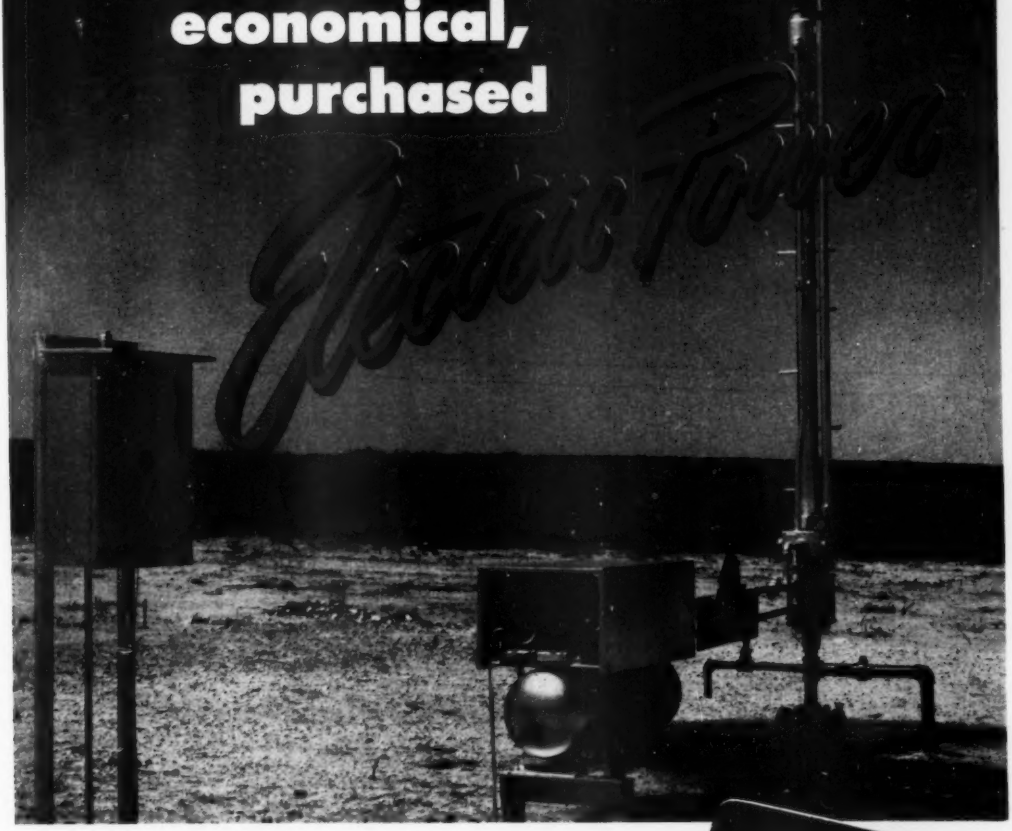
Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

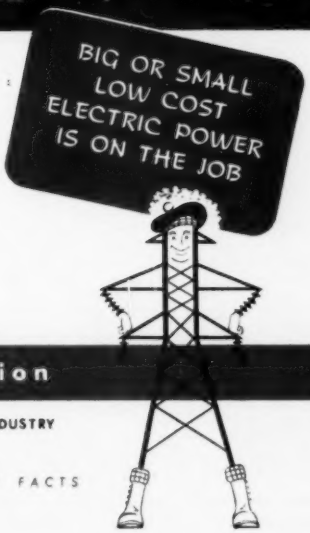
Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

SOUTH TEXAS pumps with... economical, purchased Electric Power



Many South Texas stripper wells are being efficiently, profitably pumped by *PEP. The hydraulic pump shown above on location near Benavides, Texas, is situated in a field that is powered entirely by Electric Power. Automatic control . . . higher safety factor . . . maximum portability . . . low initial capital investment . . . and small operating, maintenance and labor costs are big advantages. Why don't YOU take advantage of these features? Contact the Power Engineer of your nearest Electric Power Company for details. Let *PEP go to work for you!

*PEP—Purchased Electric Power



Petroleum Electric Power Association

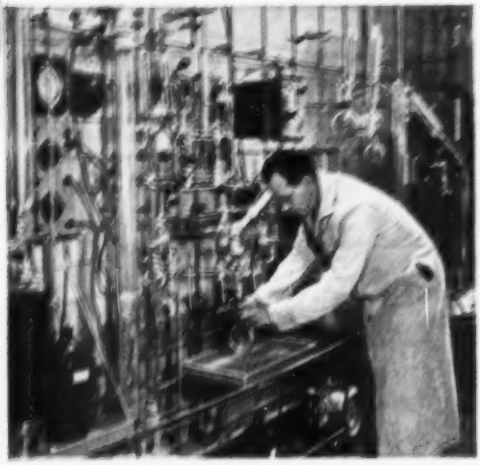
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS

OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

These Great Laboratory

PETROCHEMICALS offer independent inventors great opportunity for exploration and reward. Such synthetics as Nylon, Vinylite, Neolite are already indispensable to our expanding economy—and new ideas in this area are at a premium today.



UNDER THE SINCLAIR PLAN, chemistry laboratories like these are open for the first time to independent inventors.

ELECTRON MICROSCOPE, capable of magnifying 100,000 times, is typical of the expensive equipment now available.

Facilities Are Open to You

Many inventive people have responded to the Sinclair Plan's offer of laboratory facilities — to others who wish to do so, a suggestion: There is promise and profit in oil-based synthetics.

EIGHT months ago, Sinclair turned over a part of its great laboratories at Harvey, Illinois, to independent inventors who had promising ideas in the field of petroleum products but who did not have the facilities needed to develop or prove out their ideas.

To date nearly 5,000 people have submitted ideas to the laboratories, and the Plan is recognized as a valuable service to independent inventors. As a result we have made the Sinclair Plan part and parcel of the long-range operation of our company.

There may be inventive people interested in this Plan but wondering what sort of ideas or what areas would be profitable to explore. To those people we suggest the field of petrochemicals. Such things as plastics, synthetics, substitutes and new materials as yet undeveloped—made from petroleum—offer great opportunities for invention and reward.

If you have an idea of this sort—or in the general area of petroleum products or applications—you are invited to submit it to the Sinclair Research Laboratories. In your own interest, each idea must first be protected by a patent application or a patent.

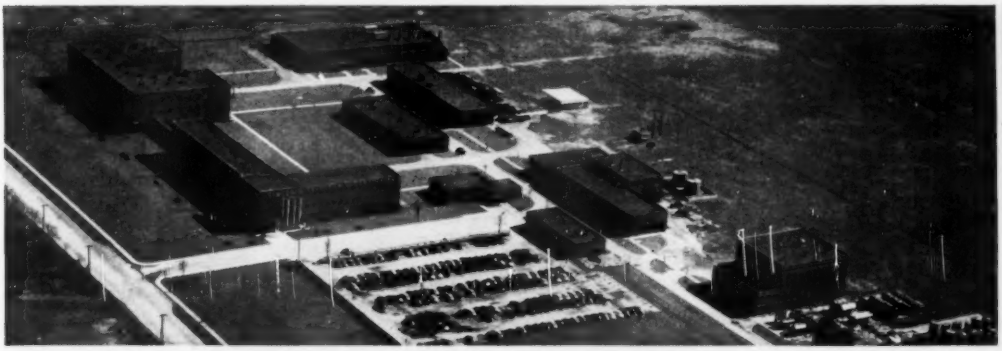
The inventor's idea remains his own property

If the laboratories select your idea, they will make a very simple arrangement with you: In return for the laboratories' work, Sinclair will receive the privilege of using the idea for its own companies, free from royalties.

This agreement in no way hinders the inventor from selling his idea to any of the hundreds of other oil companies for whatever he can get. Sinclair has no control over the inventor's sale of his idea to others, and has no participation in any of the inventor's profits.

HOW TO PARTICIPATE: Instructions are contained in an Inventor's Booklet available on request. Write to: W. M. Flowers, Executive Vice-President, Sinclair Research Laboratories, Inc., 600 Fifth Avenue, New York 20, N. Y.

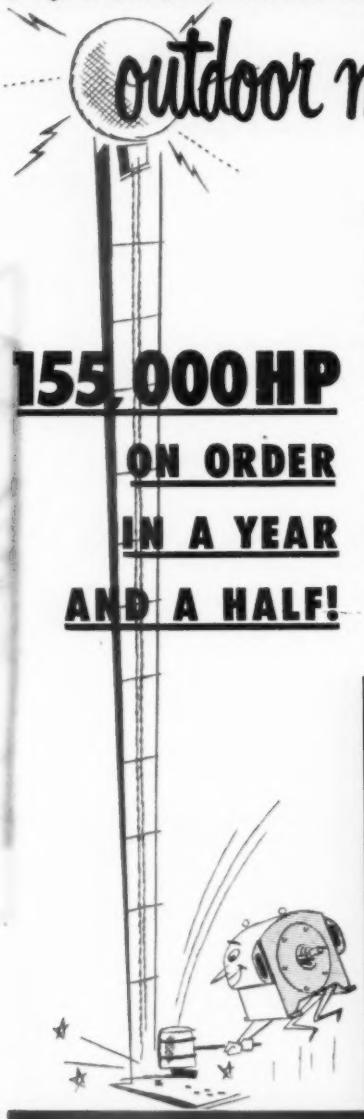
IMPORTANT: *Please do not send in any ideas until you have sent for and received the instructions.*



SINCLAIR RESEARCH LABORATORIES—nine buildings containing the most modern testing equipment known—have contributed many of today's most important developments in petroleum. Under the Sinclair Plan, the available capacity of these great laboratories is being turned over to work on the promising ideas of independent inventors everywhere.

SINCLAIR—for Progress

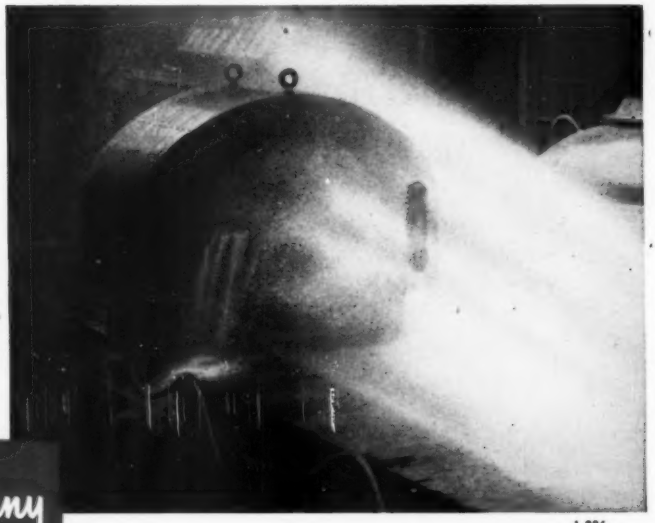
Revolutionary new Elliott outdoor motor rings the bell!



155,000 HP ON ORDER IN A YEAR AND A HALF!

When we first announced our revolutionary new outdoor motor a year and a half ago, we *knew* it was good. Our customers thought so too! Since that time we have shipped or have on order over *155,000 hp* of these outstanding motors. They are now delivering dependable power for many types of drives in a wide variety of types of applications from border to border and from coast to coast . . . Day in and day out they operate unprotected in the heat, humidity, sand, alkalies, hurricanes of the South, salt spray of the coastal installations and blizzards of the far North . . . More and more industries are investigating the possibilities of this outstanding motor and the economies of outdoor installation. Available from first size above NEMA frames and larger. Call or write your nearest Elliott District Office for consultation.

Motor undergoing spray test at factory



L-826

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Plants at: JEANNETTE, PA. • RIDGWAY, PA.
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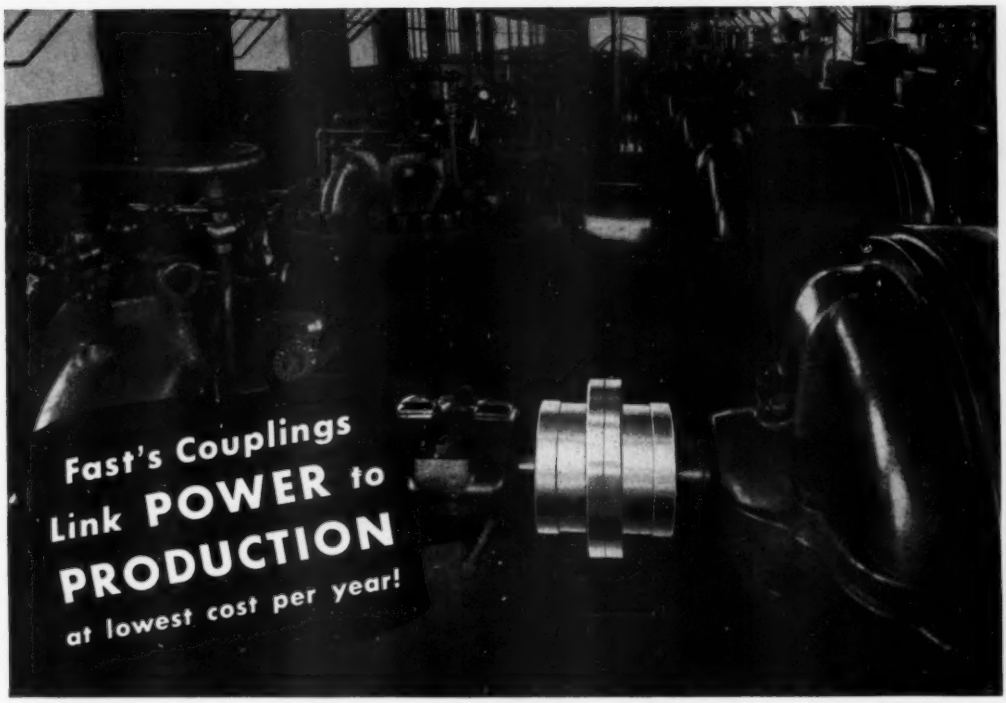


Over half a million FAST'S Couplings now in use!

THROUGHOUT industry, Fast's are rated the most dependable couplings on the market... to the tune of over half a million now in service! Year in, year out, they continue to *outlast the equipment they connect* . . . save time, maintenance and money by eliminating costly coupling failures.

Actual cases on record show many Fast's Couplings have been in operation for 25 and 30 years without trouble. And every major producer of high-speed equipment now uses Fast's!

Solve your coupling worries! Write today for full details on Fast's Couplings and Koppers Engineering Service to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 284 Scott St., Baltimore 3, Maryland.

Here's How FAST'S Save You Money

Free Service—Koppers free engineering service assures you the right coupling for the job.

Rugged Construction—Fast's still maintains its original design, without basic change or sacrifice in size or materials. Result: freedom from expensive coupling failures.

Lowest Cost per Year—Fast's Couplings usually outlast equipment they connect. Their cost may be spread over many years!

KOPPERS®

FAST'S
THE ORIGINAL
GEAR-TYPE
Couplings

INDUSTRY'S STANDARD FOR 32 YEARS

KOPPERS COMPANY, INC., *Fast's Coupling Dept.*
284 Scott St., Baltimore 3, Md.

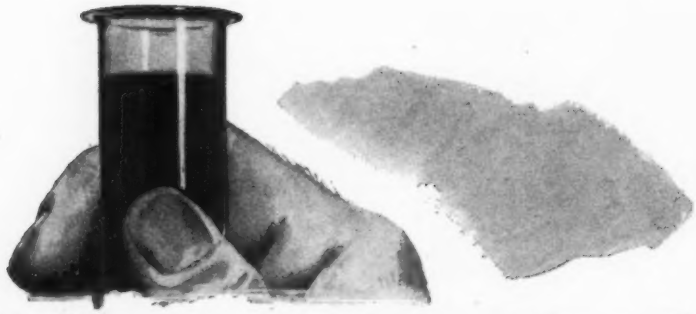
Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

Name .....

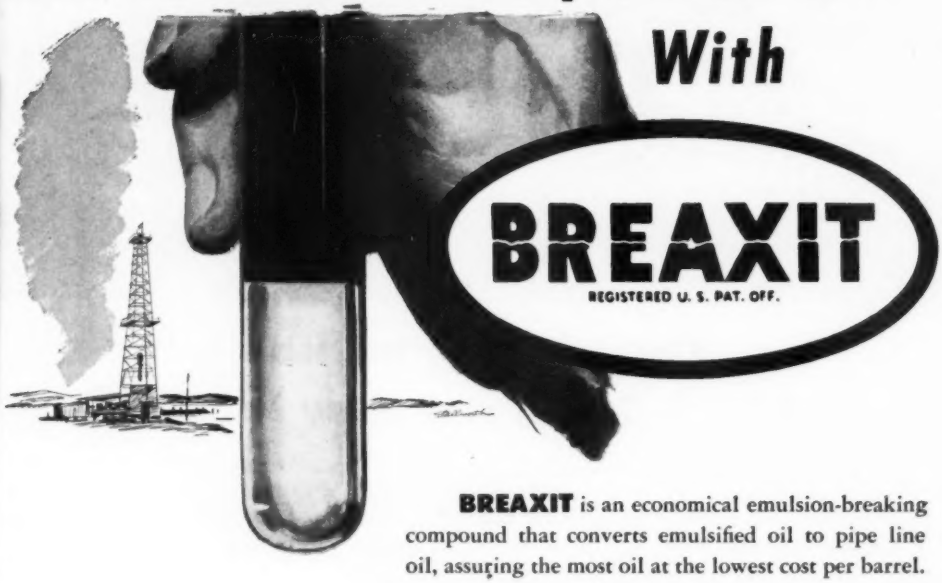
Company .....

Address .....

City ..... Zone ..... State .....



Live Oil Becomes Pipe Line Oil With



BREAXIT is an economical emulsion-breaking compound that converts emulsified oil to pipe line oil, assuring the most oil at the lowest cost per barrel.

A trained field-service engineer will make an on-the-spot test of the live oil your well is producing, then determine the *kind* and *amount* of Breaxit needed to give pipe line oil. This service provides you an emulsion-breaker tailored for individual well conditions.

Your nearest Breaxit distributor will make delivery to your lease.

BREAXIT is sold by

HUMBLE OIL & REFINING CO.
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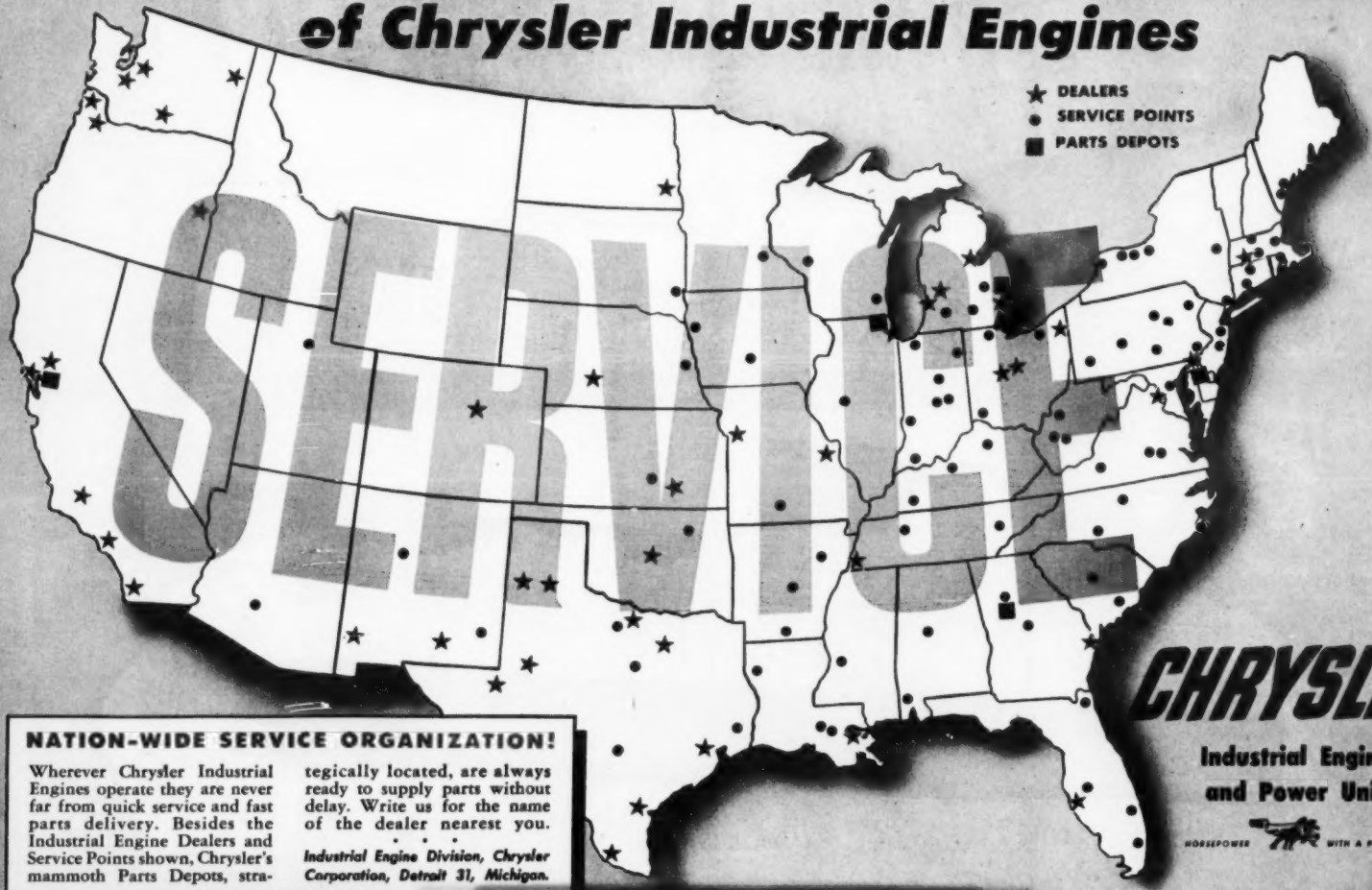
THE GREAT INVISIBLE FEATURE

of Chrysler Industrial Engines



NATION-WIDE SERVICE ORGANIZATION!

Wherever Chrysler Industrial Engines operate they are never far from quick service and fast parts delivery. Besides the Industrial Engine Dealers and Service Points shown, Chrysler's mammoth Parts Depots, strategically located, are always ready to supply parts without delay. Write us for the name of the dealer nearest you.

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Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.

CHRYSLER

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HORSEPOWER WITH A PEDIGREE

There are so many good reasons for using

LANE WELLS

DRILLABLE BRIDGING PLUGS

POSITIVE SETTING

Those big, interlocking slips hold fast with minimum strain on the casing.

LEAK-PROOF PACKOFF

Longer sealing element packs off securely against pressures, *either up or down*. Differential pressures as high as 10,000 p.s.i. have been securely held, on cold test.

EASY TO DRILL OUT

or knock down . . . 4 to 6 hours with either rotary or cable tools.

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Run on wire line conductor cable—extra-large clearance gives faster running in fluid.

OUTLASTS CASING

on abandonments, false bottoms or other permanent installations.

ECONOMICAL IN TIME AND MONEY, BOTH!

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Tomorrow's Tools—Today!

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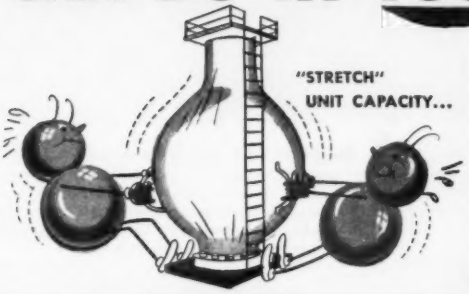
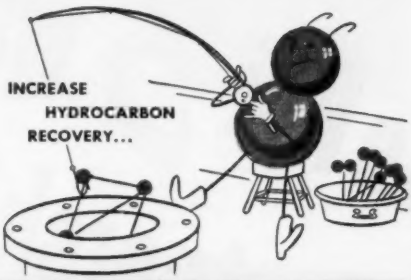
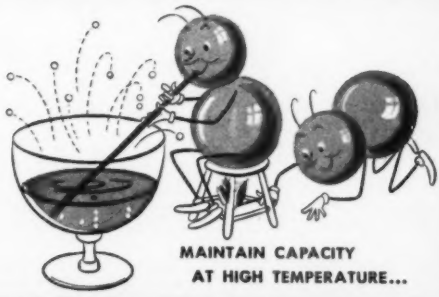
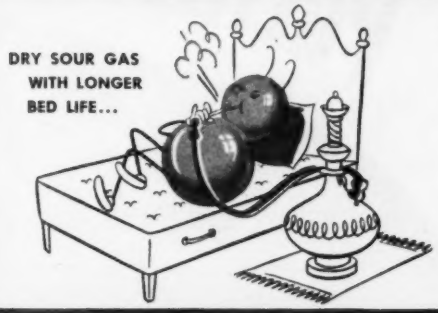
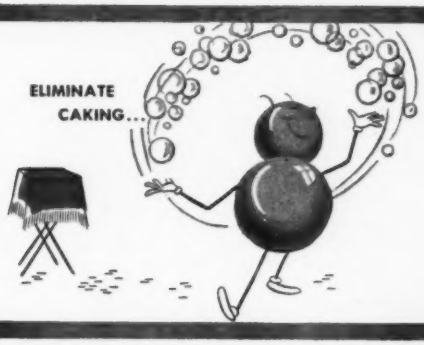
LOOK WHAT MR. SOVABEAD CAN DO IN YOUR DEHYDRATOR!

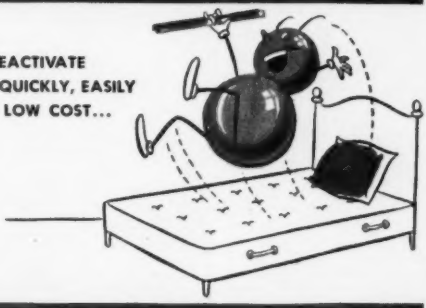












NOW... S/V Sovabead *is recommended* by most leading designers and manufacturers of solid-type natural gas dehydration units... *is used* by a majority of all operators of such units... *is performing satisfactorily* in hundreds of installations throughout the world!

Let S/V Sovabead improve *your* dehydration operations. Call your Socony-Vacuum Representative today!

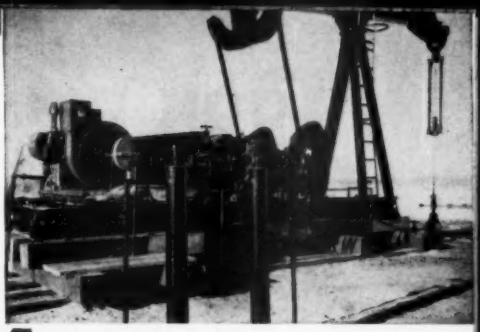
SOCONY-VACUUM

Process Products

Process Products
SOCONY-VACUUM

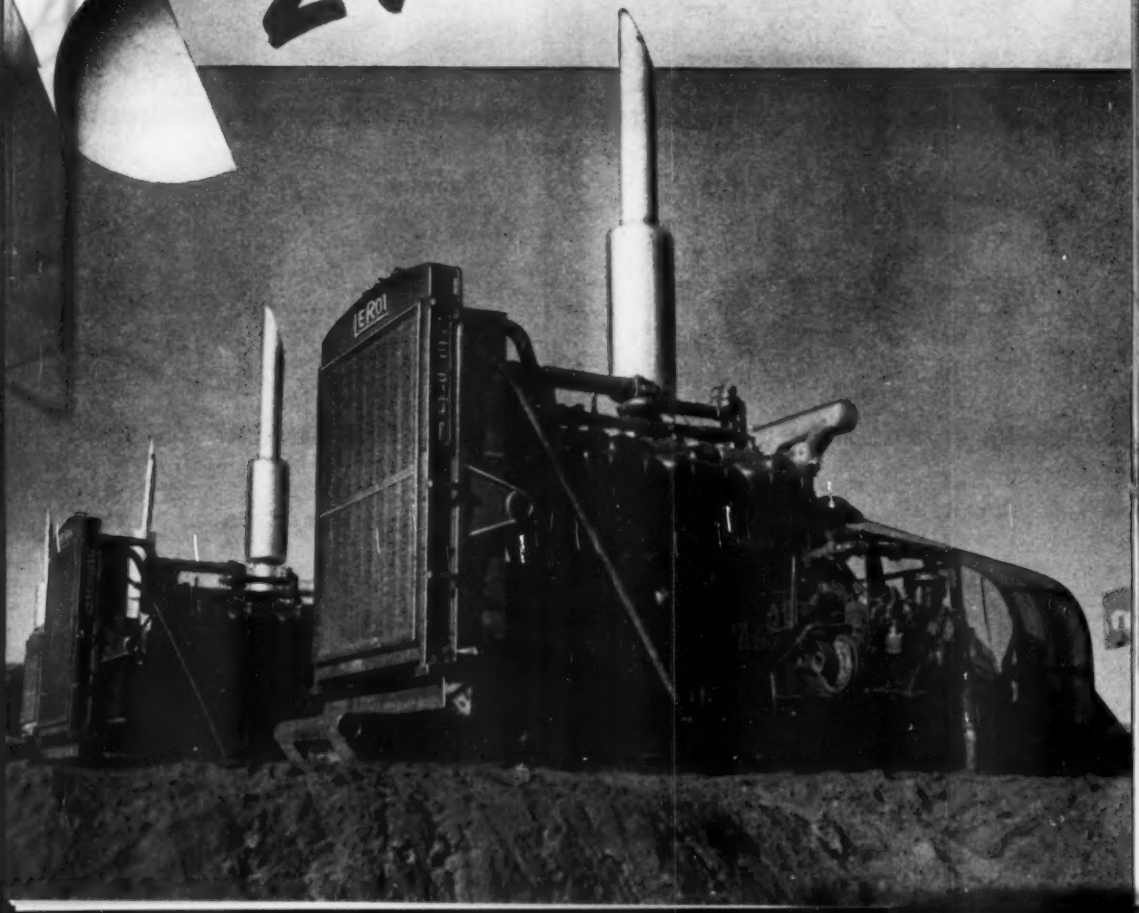
SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

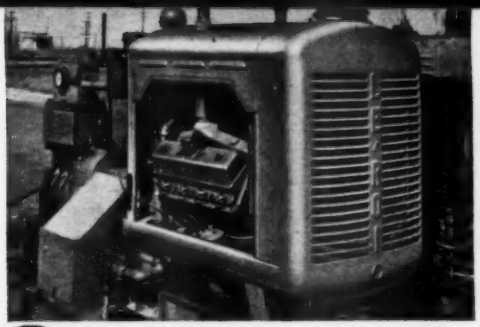
Le Roi 3 way Partnership



1 Better Engines. An example is the modern Le Roi A288 well-pumping engine located at a major oil company's lease in Oklahoma City. This engine has run 282,952 HP-hours at about one half the cost per HP-hour the company considers a good average. That's typical of Le Roi's progressive design policy to meet your problems.

24-hour-a-day





2 Better Applications. Exclusive Le Roi distributors and factory men are oil-field power specialists. They know engines and how to recommend best operating speeds and accessory combinations to give you low-cost, lasting power.

3 Better Service. Keeping your Le Roi engines running is the sole responsibility of our distributors and Tulsa branch-office staff. Parts on hand when you need them, top-notch service men on 24-hour call, and unexcelled overhaul facilities assure your getting the most out of Le Roi oil field engines.

service for 5 years

in sour gas...never overhauled

That's Le Roi performance at this pipeline booster station, under most difficult operating conditions in district

And Le Roi's are still going strong — pumping 27,000 barrels daily, to hold 1,000 psi line pressure.

At this booster station — owned by a major pipeline company — the top-notch performance of one Le Roi F1500 led to the purchase of two more F1500's and two Le Roi L3000's.

Though one of these engines is now almost five years old, none have needed overhauling to date — and only very little maintenance has been required. This trouble-free performance has been achieved in spite of unfavorable conditions — dust, heat, and corrosive sour gas.

Because Le Roi's help keep operating expenses to a minimum, installations are being made for pipeline and other oil-field service in an ever-increasing number.

No matter what your engine application, it pays you to find out about Le Roi oil-field power from your nearby Le Roi distributor or supply house. They can show you Le Roi engines at work under conditions similar to yours, and explain the benefits of Le Roi's 3-way partnership.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio
Oil Field Headquarters: Tulsa, Oklahoma

See these Le Roi Distributors for a Profitable 3-way Partnership

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.— Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company — Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co.—Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co.—Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company—Centralia, Illinois and St. Louis, Missouri.

Michigan
Hafer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co. — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

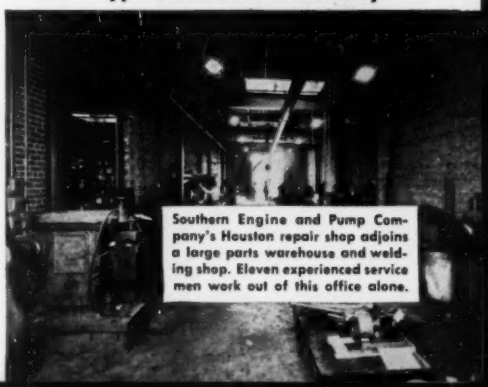
West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

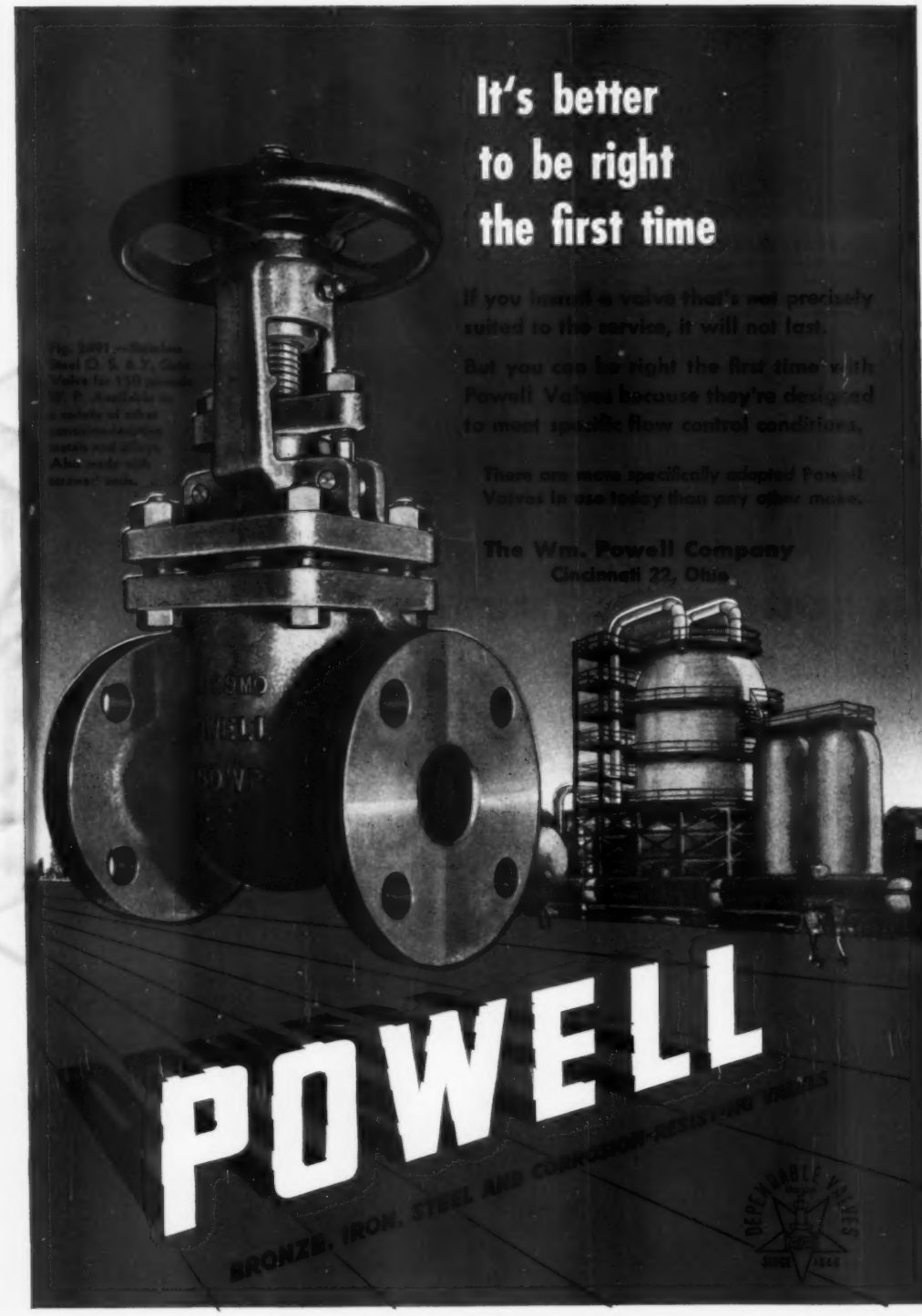
Canada
Lucey Export Ltd. — Calgary, Edmonton, Alberta.

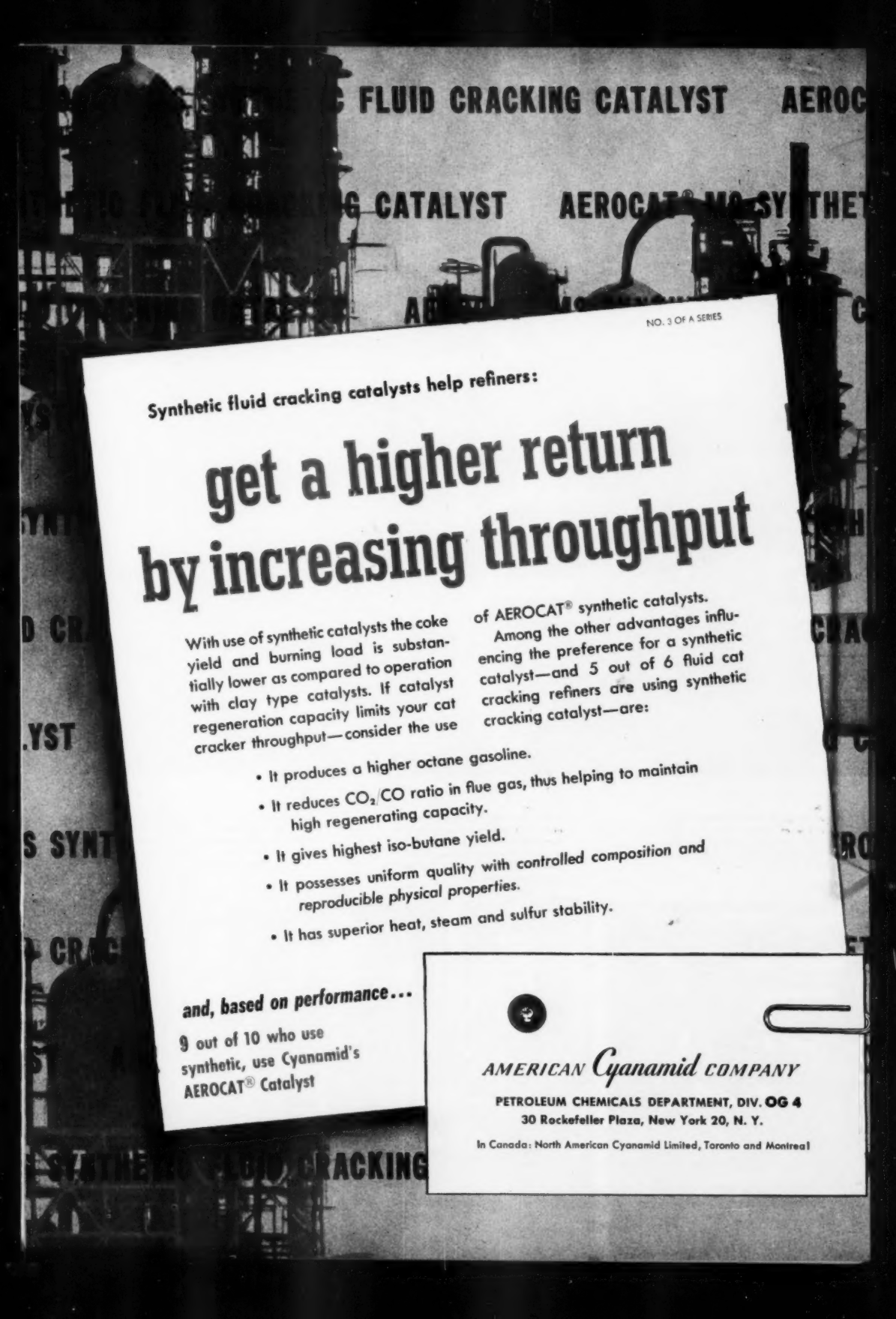
R-113

Typical LE ROI service facility



Southern Engine and Pump Company's Houston repair shop adjoins a large parts warehouse and welding shop. Eleven experienced service men work out of this office alone.


It's better
to be right
the first time
If you install a valve that's not precisely suited to the service, it will not last.
But you can be right the first time with Powell Valves because they're designed to meet specific flow control conditions.
There are more specifically adapted Powell Valves in use today than any other make.
The Wm. Powell Company
Cincinnati 22, Ohio
POWELL
BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES



NO. 3 OF A SERIES

Synthetic fluid cracking catalysts help refiners:

get a higher return by increasing throughput

With use of synthetic catalysts the coke yield and burning load is substantially lower as compared to operation with clay type catalysts. If catalyst regeneration capacity limits your cat cracker throughput—consider the use of AEROCAT® synthetic catalysts.

Among the other advantages influencing the preference for a synthetic catalyst—and 5 out of 6 fluid cat cracking refiners are using synthetic cracking catalyst—are:

- It produces a higher octane gasoline.
- It reduces CO_2/CO ratio in flue gas, thus helping to maintain high regenerating capacity.
- It gives highest iso-butane yield.
- It possesses uniform quality with controlled composition and reproducible physical properties.
- It has superior heat, steam and sulfur stability.

and, based on performance...

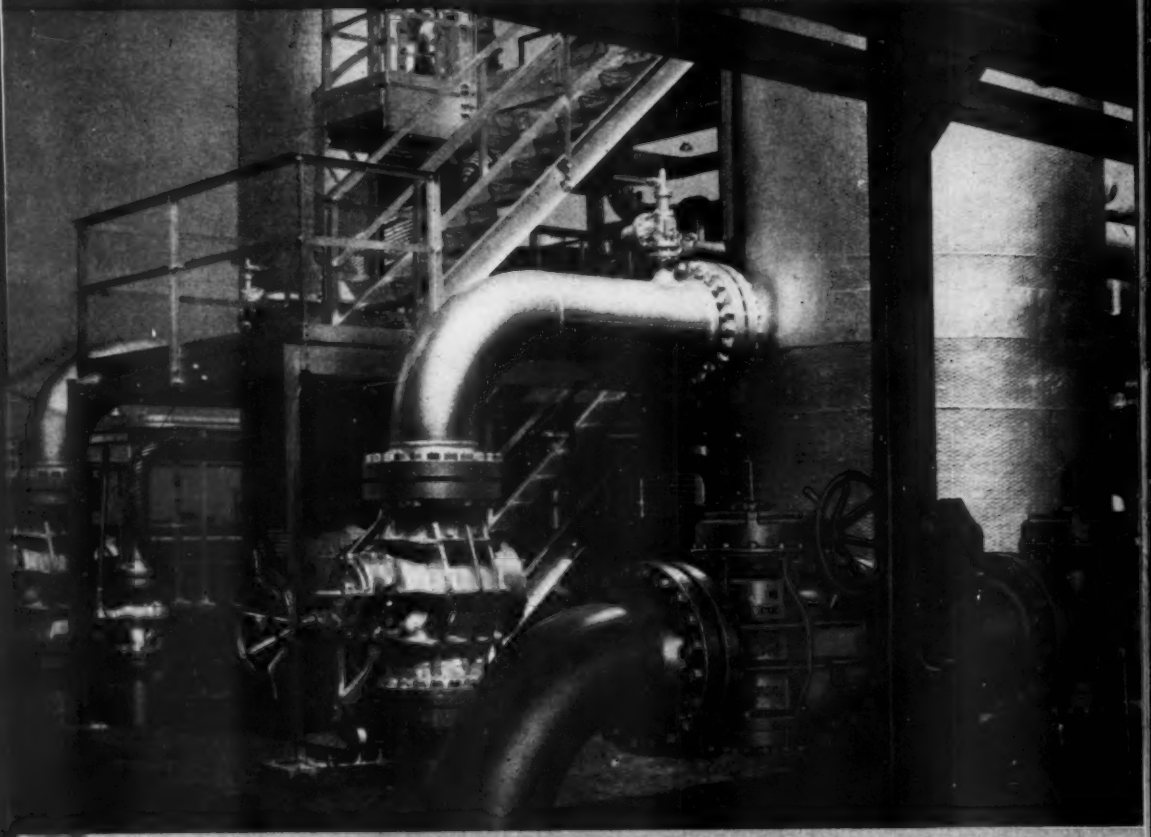
9 out of 10 who use synthetic, use Cyanamid's AEROCAT® Catalyst

AMERICAN Cyanamid COMPANY

PETROLEUM CHEMICALS DEPARTMENT, DIV. OG 4
30 Rockefeller Plaza, New York 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal

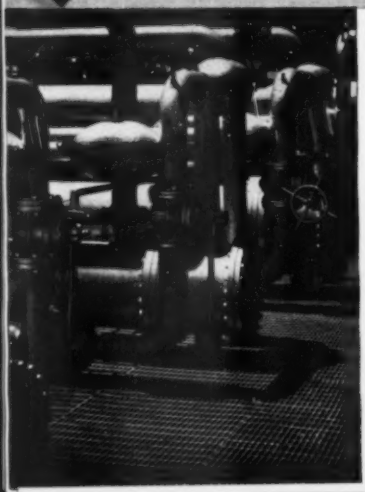
IT'S EASY TO FIT THE RIGHT

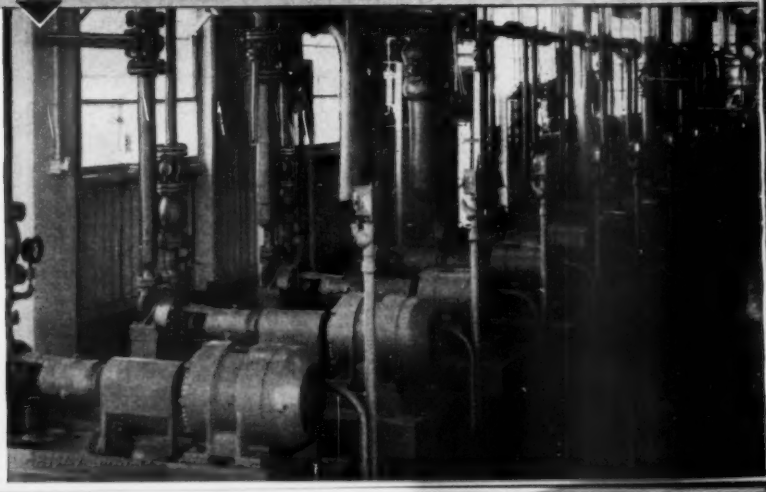


SPECIAL APPLICATIONS Nordstrom experience can tell you what special refinery applications you can successfully make with Nordstrom valves.

INSIDE OR OUT The same characteristics that make Nordstroms the most economical valves for unusual line conditions make them the best bet on inside equipment lines.

ALL SIZES There's a Nordstrom valve in the right size, the right pressure class, the right metals, the right end connection, and the right lubricant for nearly every refinery or gasoline plant service.





NORDSTROM VALVE TO

Gasoline Plant and Refinery Services

With the background of several hundred thousand Nordstrom valves in refinery service around the world, Nordstrom engineers can help you select the best, most efficient designs for each type of refinery operation.

Nordstrom valves are especially suitable for refinery lines. The extra seal of plastic lubricant around the seat port area protects seating surfaces against line fluid, and at the same time gives a hydraulic jacking action for easy opening where line conditions cause many valves to stick.

For nearly all complex, hard-to-control refinery line fluids there are suitable Nordstrom valves. These are typical Nordstrom services:

HANDLING HYDROCARBONS—Loading rack, marine terminals, general transfer and run-down lines and other applications throughout the refinery where light hydrocarbons are the line fluid.

CHEMICAL TREATING—Handling treating acids, caustic, Doctor Solution, copper chloride and other reagents, in continuous or batching processes. Special metals are available.

LUBE OIL TREATING—Selective solvent treating of lube oils, including treatment with phenol, etc., along with the deasphalting of oils with propane, methyl ethyl ketone and other methods.

REFINERY GASES—In unit operations or compressor plants, Nordstrom lubricant-sealed valves are generally preferred.

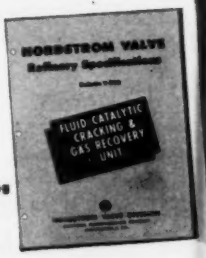
AVIATION GASOLINE PRODUCTION—Manufacture of alkylate for making high octane gasoline, either by the sulphuric acid process or anhydrous hydrofluoric acid process. Special metals, packings and flow area facings are available.

WATER SERVICES—Condenser service, water process lines and power plant lines.

AIR LINES—All types of air service lines.

PETRO-CHEMICAL MANUFACTURE—Examples: phthalic anhydride, isopropyl alcohol, synthetic glycerine, synthetic ethyl alcohol, napthenic acids and other petroleum based chemicals.

Now You Can Easily Fit Nordstrom Valves to the Specific Services in Your Specific Refining Process

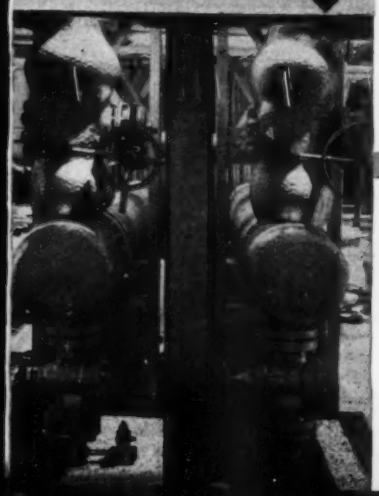


So that refinery engineers can select the proper Nordstrom Valves for each service in the principal refining processes, a series of specification sheets showing recommended materials, pressure classes, lubricants and valve figure numbers has been prepared. There is a special Nordstrom Specification Bulletin for each of these processes:

- Catalytic Polymerization
- Crude Topping and Vacuum Distillation
- Cycleversion
- Delayed Coking
- Distillate Recovery in Cycling Plants
- Duo-Sol Solvent Extraction
- Fluid Catalytic Cracking and Gas Recovery
- Girbotol Process
- Houdriflow Catalytic Cracking and Gas Recovery
- Hydroforming Process
- Light Ends Fractionation
- Naphtha Polyforming
- Phenol Extraction
- Propane Deasphalting
- Propane Dewaxing
- Solexol Process
- Solvent Dewaxing
- Thermal Cracking
- Thermal Reforming

A Nordstrom service engineer will be glad to review these specification sheets with you. Call your nearest Rockwell office or write to Rockwell Manufacturing Company, 400 N. Lexington Ave., Pittsburgh 8, Pa.

EASY STANDARDIZATION Because Nordstrom builds such a wide range of types and sizes, with wrench, geared or automatic operation, you can standardize on them throughout the refinery or gasoline plant.



There's an oil field supply store with Nordstrom Valves and Nordstrom Service as close as your telephone.

Rockwell Built

Nordstrom Valves

Lubricant Sealed to Keep Upkeep Down

Another ROCKWELL *Product*

ROCKWELL MANUFACTURING COMPANY
400 N. Lexington Ave., Pittsburgh 8, Pa.

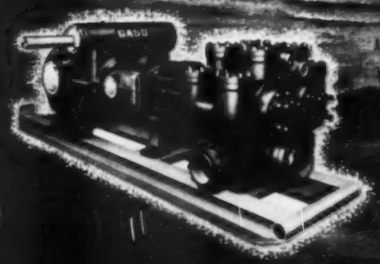
DIPLODOCUS, WORLD'S LARGEST LAND ANIMAL

GASO World's Best Known Portable Pumps

"Dip" was a prehistoric monster with a snout-to-tail measurement of 75 feet, a weight of 25 tons and an appetite for tree-tops, his favorite meal.

Gaso Pumps are modern marvels of compact efficiency with an appetite for tough service and a fondness for life which keeps them on the job years after ordinary pumps have been scrapped.

That's why GASO Pumps are so predominantly first in the favor of pipeline men.



GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.
EXPORT OFFICE: 149 BROADWAY, NEW YORK

Minneapolis: W. L. SOMMER CO., 419 Lake Street • Los Angeles: 2329 Chambers St., Vernon • Western Canada: Lufkin Machine Co., Ltd., Edmonton, Alberta

GASO PUMPS

for every oil industry need

FACT

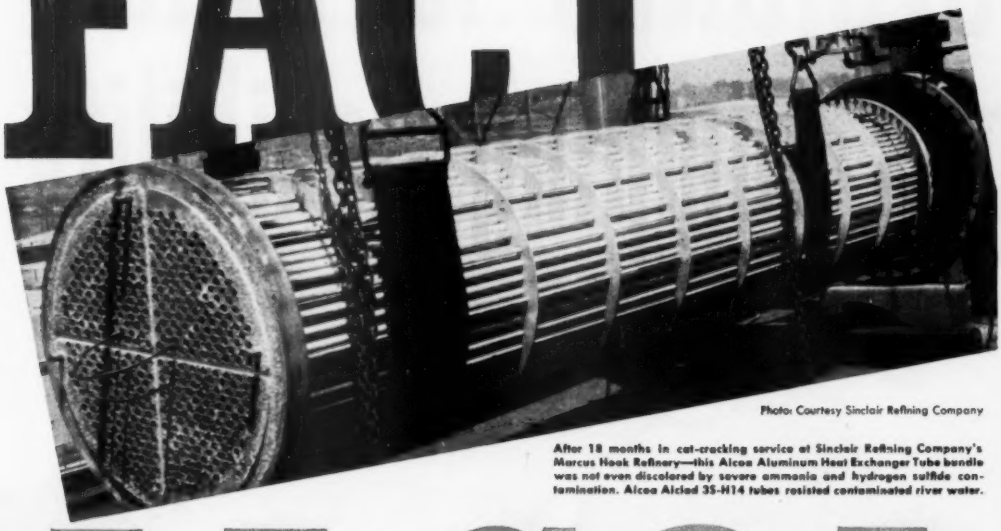


Photo: Courtesy Sinclair Refining Company

After 18 months in cat-cracking service at Sinclair Refining Company's Marcus Hook Refinery—this Alcoa Aluminum Heat Exchanger Tube bundle was not even discolored by severe ammonia and hydrogen sulfide contamination. Alcoa Alclad 3S-H14 tubes resisted contaminated river water.

ALCOA

knows most about the use and application of aluminum heat exchanger tubes

Alcoa pioneered the use of aluminum in heat exchanger tubes 43 years ago. Although their sale today is limited by government regulation, you will want to start planning with a copy of the booklet, "Alcoa Aluminum Heat Exchanger Tubes." Write:

ALUMINUM COMPANY OF AMERICA • 1864D Gulf Building, Pittsburgh 19, Pa.

OVER 6-MILLION FEET OF ALCOA TUBES ARE IN USE FOR APPLICATIONS LIKE THESE . . .

PETROLEUM

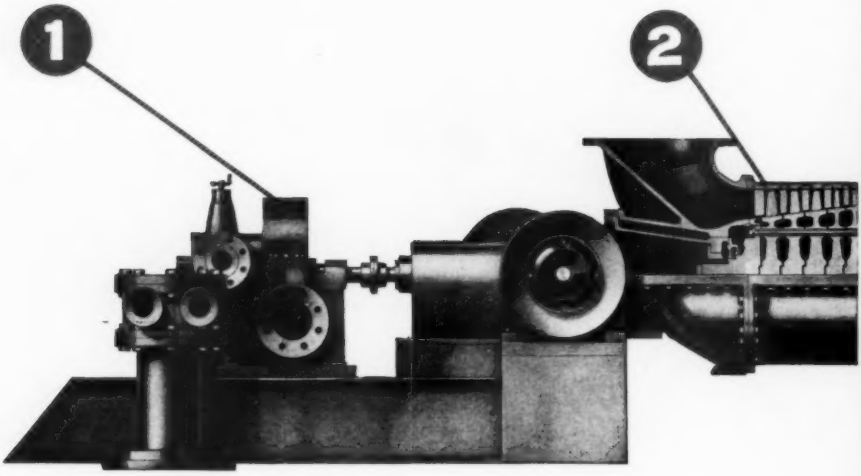
Condensers handling hydrocarbon fractions from such processes as Thermal and Catalytic cracking, reforming, polymerizing, etc.
Vapor recovery condensers
Lube oil coolers
Natural gas compressor aftercoolers
Recompressor aftercoolers
Hydrogen sulfide gas coolers
Furfural condensers and heat exchangers
Propane chilling
Wax sweaters
Lean oil—rich oil exchangers
Amine solution coolers
Glycol-amine heat exchangers and reboilers
Jacket water coolers

CHEMICAL

Butanol
Ethanol
Ethylene Glycol
Glycerin
Hydroabietyl
Isopropanol
Methanol
Phenol
Propylene Glycol
Acetaldehyde
Formaldehyde
Furfural
Heptaldehyde
Acetic acid
Stearic, Palmitic, Maleic Oleic acids
Butyric acid
Naphtha
Ricinoleic acid
Acetanilide
Ammonia
Hydrogen Cyanide
Nitric acid (concentrated)
Pyridine
Hydrogen Sulfide
Benzene
Dichlorobenzene
Gelatin
Hydrogen Peroxide
Turpentine
Xylene

Use Alcoa Alclad 3S-H14 Heat Exchanger Tubes with fresh, brackish and salt-cooling waters

DESIGNED for better gas pumping flexibility



Special G-E features like these provide service reliability, easy maintenance!

1. **Important auxiliaries are shaft-driven**—The power plant is self contained, and when operating, supplies electric power for camp and all station auxiliaries.

   Complete automatic control provides starting, supervision and full protection to power plant. Standard familiar types of instruments and relays are assembled on metal-enclosed switchboard to centralize all control.

2. **High efficiency axial flow compressor**—The precision-balanced rotor is composed of several wheels bolted to stub shafts, with chrome-iron alloy blades to resist corrosion and erosion, secured by strong dovetails.

3. **Periodic maintenance is easy**—The all-metallic combustion chambers include stainless steel inner shells to withstand combustion temperatures. These are easily removable for inspection.

4. **Strength where strength is needed**—The composite turbine wheels have high-temperature stainless steel rims, welded to a forged main shaft and body. The few stages of the impulse type turbine permit use of long-life erosion-resistant buckets of high-temperature materials, with liberal clearances.

GENERAL ELECTRIC

661-30

New G-E combustion gas turbine—inherently suited for gas pipeline pumping—provides adjustable-speed flexibility for pipeline flow; saves water, oil and manpower!

A "natural" for gas pipeline pumping—that's General Electric's combustion gas turbine! Specifically designed for centrifugal compressor drive, it gives you low-cost operation. In addition:

—You can save on operating manpower and supplies. Power plant control is automatic and self-protecting, with all the important auxiliaries shaft-driven from the main unit.

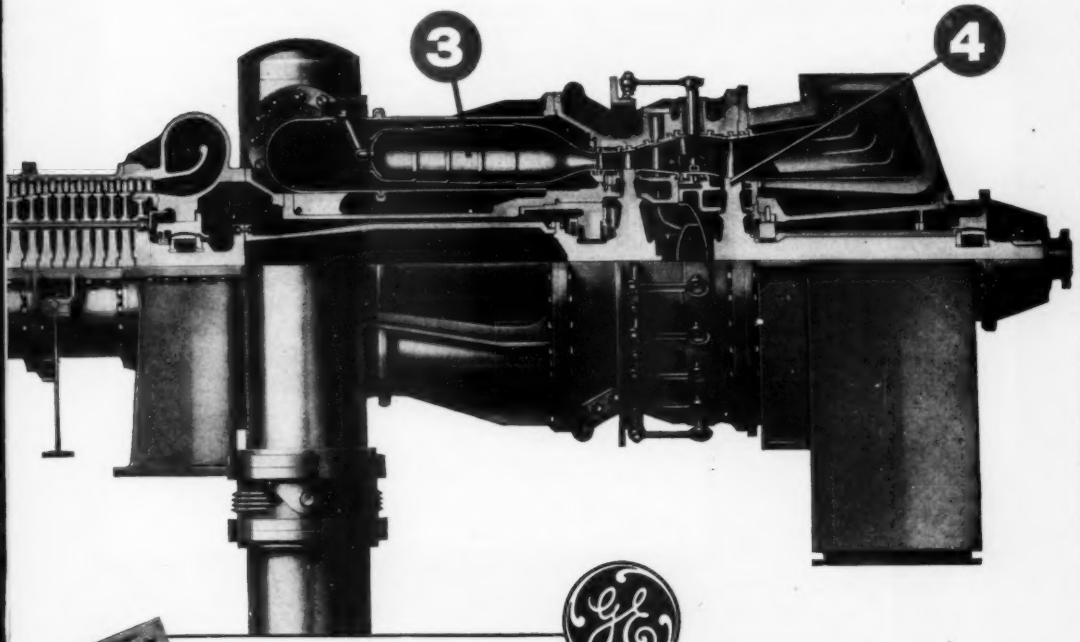
—You save on cooling water—an important point where water is scarce.

—You save on oil. A typical 5000-hp installation requires little or no make-up oil.

—You get adjustable speed for flexibility of operation to suit a variety of pipeline-flow conditions.

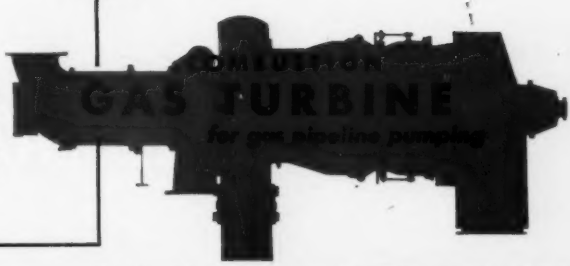
—You get up to 25 per cent extra hp in winter, when demand for gas is greatest.

Your G-E representative will gladly discuss this gas turbine in terms of *your* gas pipeline operation.



Send for New Bulletin!

A new 16-page illustrated booklet fully describes the G-E gas pipeline gas turbine. For your copy (Bulletin GEA-5530) call your nearest G-E sales office or write *Section* 661-30, *General Electric Co., Schenectady 5, N.Y.*



—backed by 45 years of turbine leadership!

AXELSON

HYDRAULIC LONG STROKE PUMPING UNIT

Three major phases in long stroke pumping offer distinct profit producing advantages to the petroleum operator:

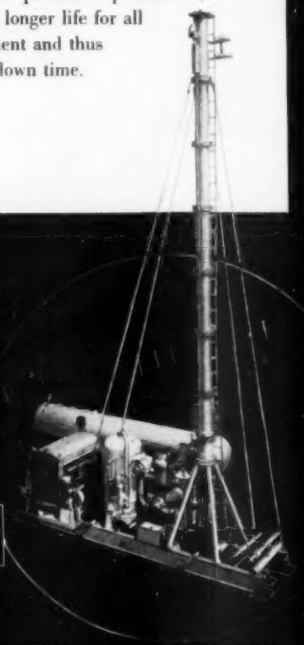
INCREASED STROKE LENGTH means... (a) overcoming stroke loss due to rod and tubing stretch; (b) greater plunger travel provides marked assistance in the handling of gassy fluids; (c) decreasing frictional wear by distributing it over a greater length.

FEWER STROKE CYCLES PER MINUTE means... that all surface and sub surface pumping equipment going through its cycle 5 times per minute will last longer than the same parts doing the same job 15 to 20 times per minute.

COMBINATION OF LONG STROKE AND FEWER STROKE CYCLES PER MINUTE means... (a) that rods can be successfully operated with peak stresses from 20 to 30 per cent over conventional pumping practice; (b) decreased impulse load factor allowing increase in pump size or pump depth; (c) rod string can be lightened due to the greater allowable stress.

While the Axelson long stroke pump is not offered as a cure all for all pumping unit problems, it does have specific applications which assure more profitable production, fewer rod failures, longer life for all subsurface equipment and thus considerably less down time.

AN AXELSON ENGINEER IS AT YOUR SERVICE FOR DISCUSSION OF ANY SPECIFIC PUMPING PROBLEM WHICH YOU MAY HAVE



AXELSON

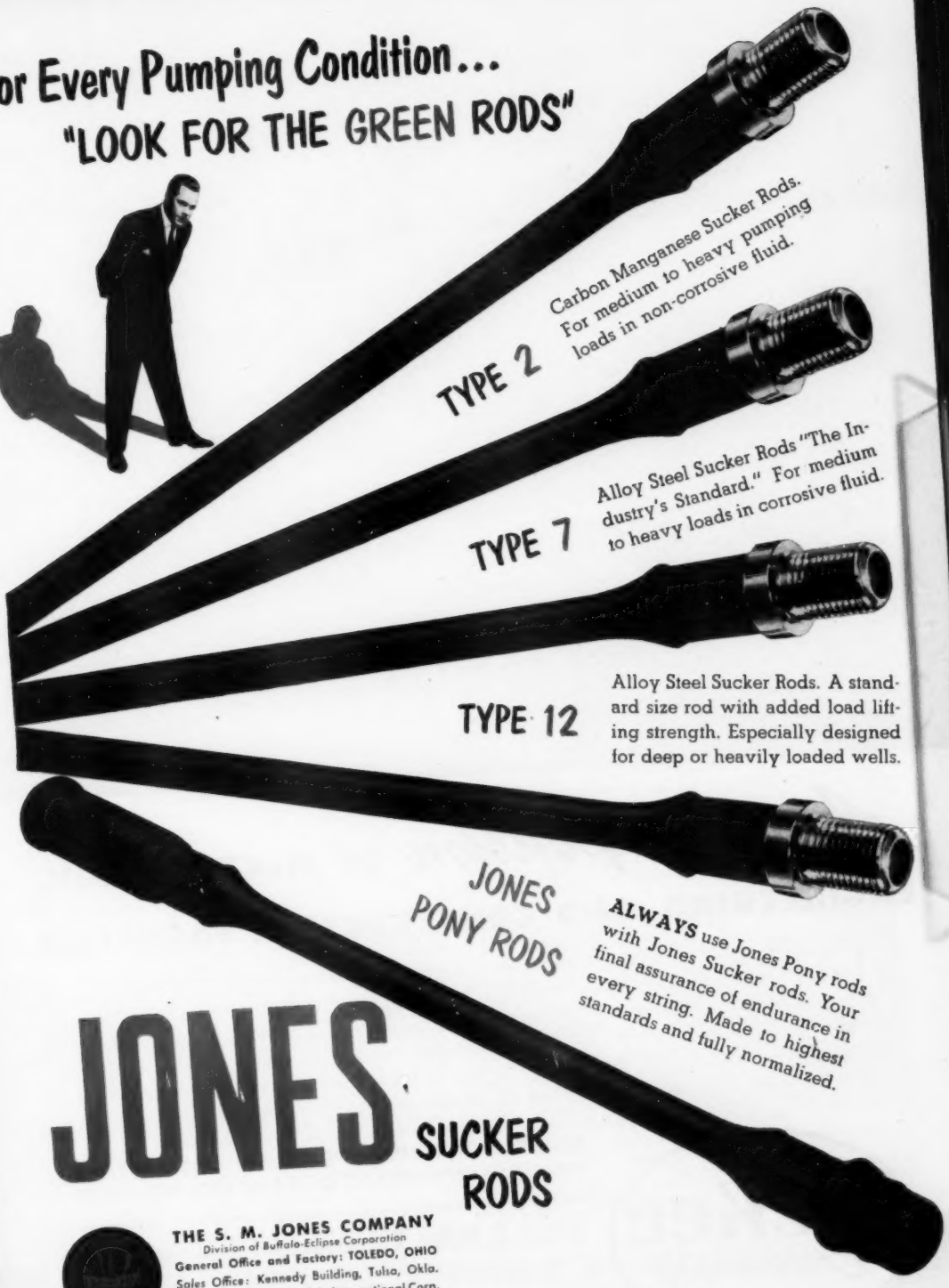
PETROLEUM PUMPING EQUIPMENT

OUR 65th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO. • 6160 SOUTH BOYLE AVENUE • P. O. BOX NO. 15335, LOS ANGELES 58, CALIFORNIA

For Every Pumping Condition...
"LOOK FOR THE GREEN RODS"



TYPE 2 Carbon Manganese Sucker Rods. For medium to heavy pumping loads in non-corrosive fluid.

TYPE 7 Alloy Steel Sucker Rods "The Industry's Standard." For medium to heavy loads in corrosive fluid.

TYPE 12 Alloy Steel Sucker Rods. A standard size rod with added load lifting strength. Especially designed for deep or heavily loaded wells.

JONES PONY RODS **ALWAYS** use Jones Pony rods with Jones Sucker rods. Your final assurance of endurance in every string. Made to highest standards and fully normalized.

JONES SUCKER RODS

THE S. M. JONES COMPANY
Division of Buffalo-Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Kennedy Building, Tulsa, Okla.
Export Sales Office: Buffalo International Corp.
50 Church Street, N. Y. C.

Another expansion OF McKEE DESIGN, ENGINEERING AND CONSTRUCTION FACILITIES

THIS new wing will add approximately 26,000 square feet of space to the McKee Building—space for further enlargement of our engineering staff.

Expansion is not new at McKee. The addition you see under construction is the third enlargement of our Cleveland headquarters, the seventh increase in engineering space here and in other cities since 1939.

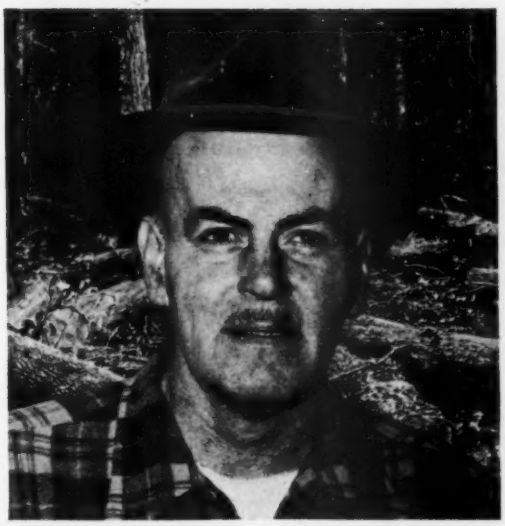
This is no mushroom growth. It is part of a steady expansion program with future additions already planned to keep pace with increasing demands for McKee engineering services.

DESIGN, ENGINEERING AND CONSTRUCTION FOR THE PETROLEUM REFINING AND IRON AND STEEL INDUSTRIES

McKee Engineering

Arthur G. McKee & Company • Established 1905

Headquarters: McKee Building, 2300 Chester Avenue, Cleveland 1, Ohio. *New York Office:* 30 Rockefeller Plaza, New York 20, N.Y. • *Washington Office:* 1507 M Street, N. W. Washington, D. C. • *England:* The Iron and Steel Division of Arthur G. McKee & Company is represented by Head, Wrightson & Company, Ltd. *District Engineering Offices:* Union, New Jersey and Tulsa, Oklahoma.



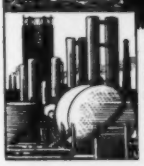
We've been asked...

"What's wrong about integration? It's the way I operate, too!"

Many businessmen have said: *"This 'integration' you big companies are attacked for is just a matter of doing more than one part of a job. So what's wrong about that? It's the way I operate, too!"*

Consider first that "integration" means simply carrying a job through several steps. Integration can't make a good company bad. It's a method any business may use as it competes for your patronage, increasing its efficiency and benefiting you by keeping prices down. Let's compare our method of operation with that of another integrated fuel-producer whose system is centuries old:

A woodcutter goes into a forest and fells trees. Standard drills into the ground and brings up oil. If the woodcutter sells the logs then and there... and if Standard sells the crude oil to some buyer at the well ... there's no integration. Each has performed only one part of the job.



Now if the woodcutter takes the next step and cuts the logs into fireplace size, he has become an integrated business. Like him, Standard works to turn the product into the forms you use. We refine our crude oil into gasoline, lubricants, fuel oil, and other products. So we're integrated, too.

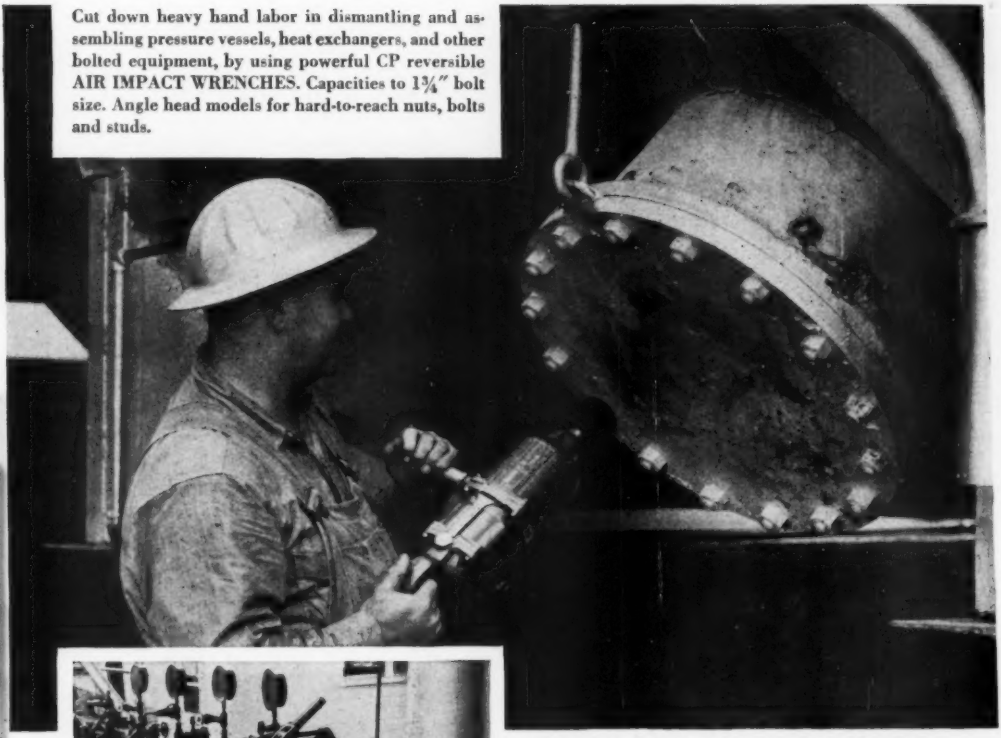
When the woodcutter hauls a load of firewood he extends his integration. He's now in the transportation business ... as is Standard when we use our tankers and pipelines to transport oil from well to refinery, and the refined products from there to areas where they'll be used.

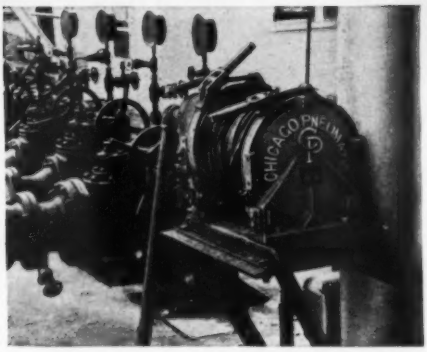
And if the woodcutter finally sells the firewood to you, his operation is fully integrated. Ours is, too, when we sell you fuel oil ... or when we sell gasoline through Company-owned service stations. So is integration wrong? Not at all. And we make best use of it to bring you better products at low cost.

STANDARD OIL COMPANY OF CALIFORNIA

• plans ahead to serve you better

Cut down heavy hand labor in dismantling and assembling pressure vessels, heat exchangers, and other bolted equipment, by using powerful CP reversible AIR IMPACT WRENCHES. Capacities to 1¾" bolt size. Angle head models for hard-to-reach nuts, bolts and studs.

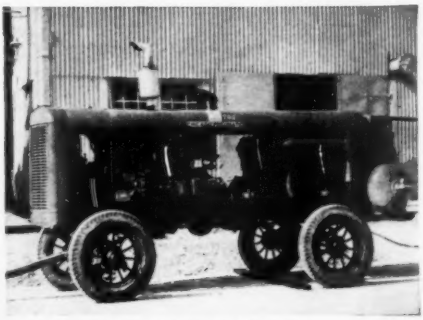




CP REFINERY EQUIPMENT makes heavy work easy

Heavy materials are easily handled with an air-driven CP UTILITY WINCH. Control of raising, lowering, holding and "teasing" operations is effected by means of the clutch and brake levers. Catheads, available with all models, increase versatility of the winch.

Write for full information.



CP PORTABLE COMPRESSORS incorporate four outstanding advantages: dependability, minimum operating cost, low maintenance, long service life. Gasoline and Diesel driven models are available from 60 to 600 cfm.

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General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
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2. Extra thickness in critical areas—for greater allowance against corrosion and erosion.

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- Available in low and intermediate alloys and various stainless steels.
- Bosses provided on all fittings for tapped openings.
- Controlled quality . . . through rigid metallurgical control. Produced, inspected and tested in one plant.
- Lower unit cost.
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GET THE FACTS! Send for your copy of the Key-Kast Welding Fitting Bulletin. (Please make request on your letterhead).

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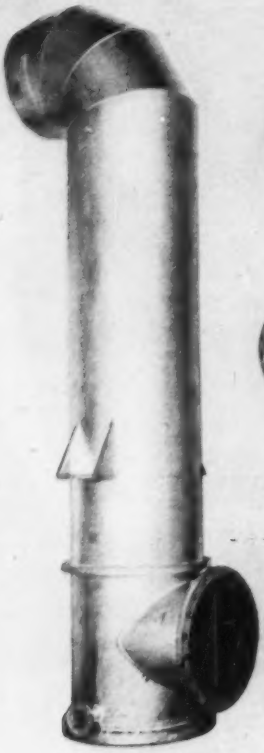
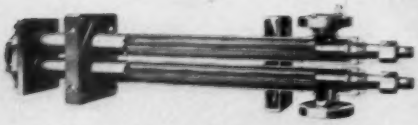
Why G-FIN *is*



G-FIN Condenser for vapors of viscous liquids



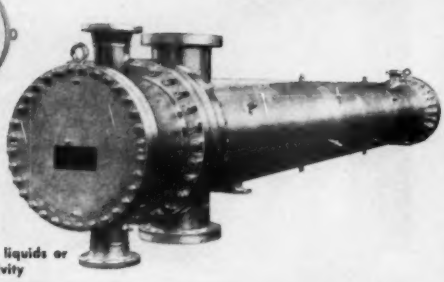
Twin G-FIN Section for heating or cooling fluids of low heat conductivity

G-FIN Storage Tank Oil Heater

G-FIN Gas Cooler

G-FIN Contactor Bundle for removing heat of a reaction

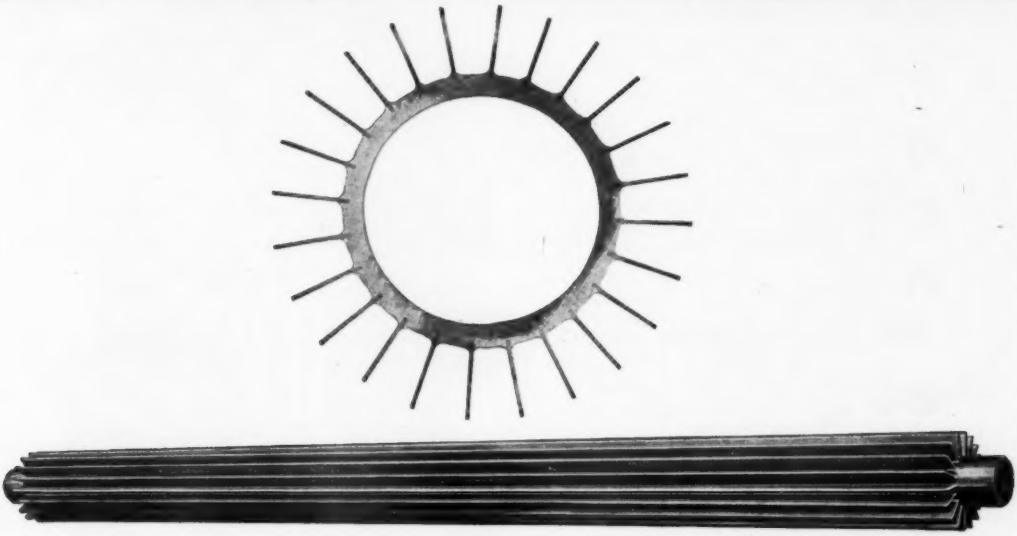
G-FIN tar-heated Fluid Heater



G-FIN Heat Exchanger for viscous liquids or gases of low heat conductivity

GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

superior for all these heat transfer duties



If your processes involve transfer of heat between fluids of unequal heat conductivity — these are the types of services for which G-R G-FIN apparatus is far superior to conventional units with bare tubes.

The longitudinal fins on the outside of G-FIN elements have six to eight times the heat transfer surface on the inside of the elements. Therefore, when a fluid of higher heat conductivity flows inside the elements, these fins provide the additional surface needed by a fluid of lower conductivity flowing outside the elements.

That's why G-FIN units require fewer tubes than bare tube units in such services. Fewer tubes mean fewer tube joints, easier cleaning, and less maintenance expense, as well as higher fluid velocities with least pressure drop.

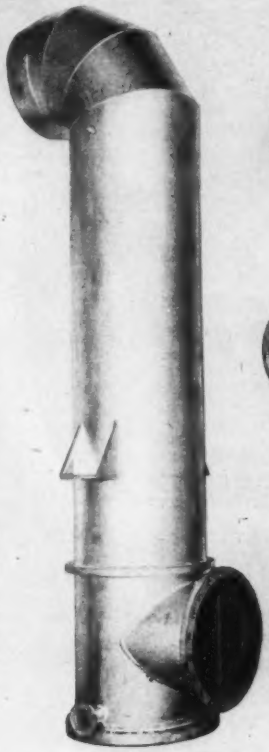
Each G-FIN unit also has special design and construction features not possessed by conventional exchangers. Write for bulletin describing suitable G-FIN apparatus for services in which you are interested.

THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

GRISCOM-RUSSELL

GR-231A

Why G-FIN *is*



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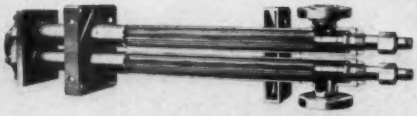

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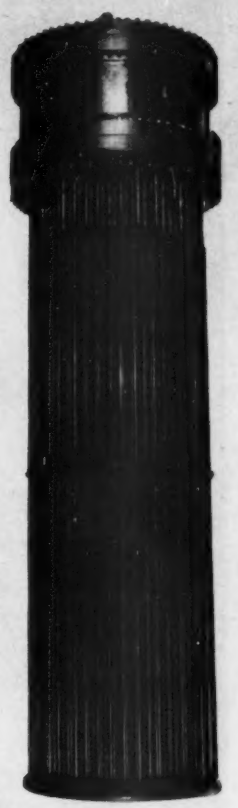

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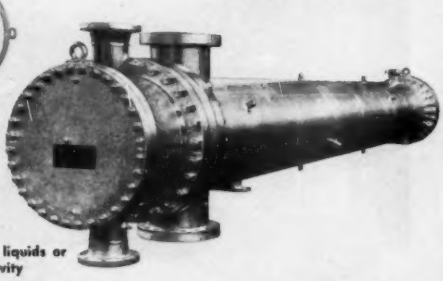
G-FIN tar-heated Fluid Heater



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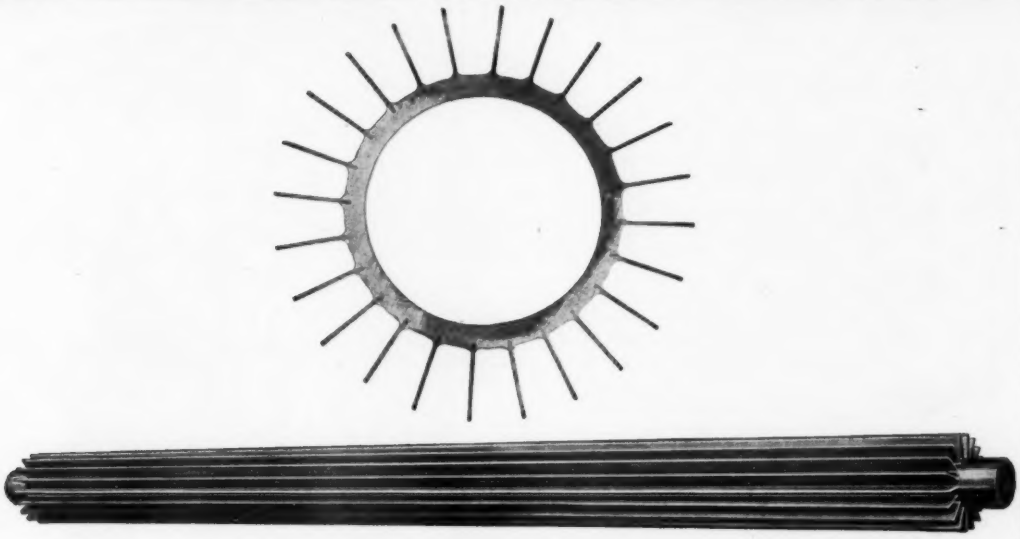
GRISCOM-RUSSELL: PIONEERS IN HEAT TRANSFER APPARATUS

superior for all these heat transfer duties



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THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

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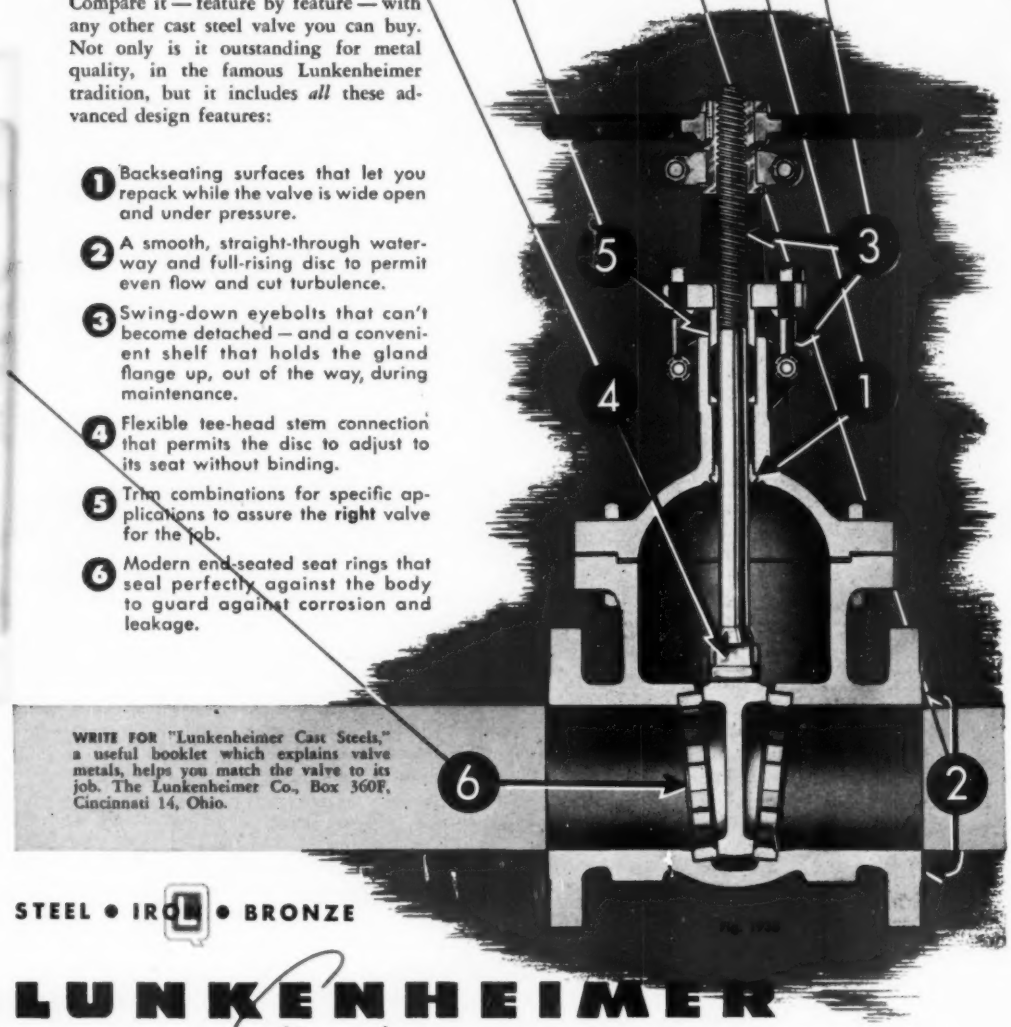
Here's the Only 300 Lb. Steel Valve Which Gives You

All These Features

Compare it — feature by feature — with any other cast steel valve you can buy. Not only is it outstanding for metal quality, in the famous Lunkenheimer tradition, but it includes *all* these advanced design features:

1. Backseating surfaces that let you repack while the valve is wide open and under pressure.
2. A smooth, straight-through waterway and full-rising disc to permit even flow and cut turbulence.
3. Swing-down eyebolts that can't become detached — and a convenient shelf that holds the gland flange up, out of the way, during maintenance.
4. Flexible tee-head stem connection that permits the disc to adjust to its seat without binding.
5. Trim combinations for specific applications to assure the **right** valve for the job.
6. Modern end-seated seat rings that seal perfectly against the body to guard against corrosion and leakage.



WRITE FOR "Lunkenheimer Cast Steels," a useful booklet which explains valve metals, helps you match the valve to its job. The Lunkenheimer Co., Box 360F, Cincinnati 14, Ohio.

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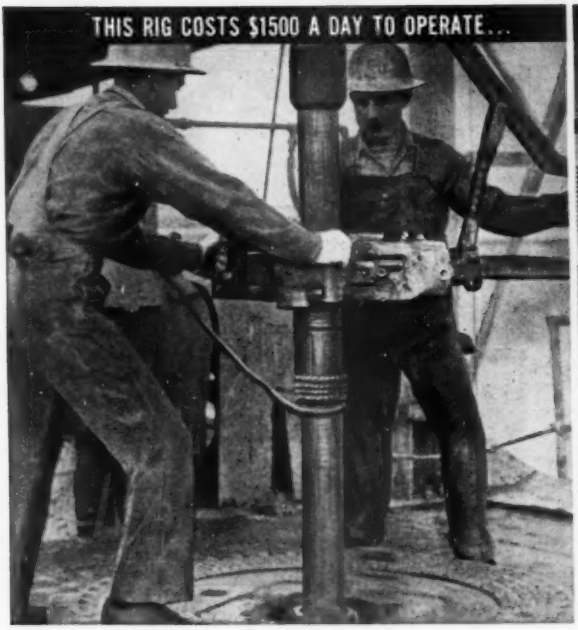

G-E 2-WAY RADIO PAYS FOR ITSELF *in 2 hours*

FOR exploratory drilling deep in the Louisiana bayous and along the tidewater ledge, the Richardson & Bass Drilling Company employs one of the largest rigs in the oil business. With operating costs of this facility at approximately $1500 a day, shutdowns must be kept to a minimum.

● Dependable General Electric 2-way radio units aboard the barge *Keystone* and at shore points keep crews and field offices in constant communication over distances up to 40 miles. In the swamps or over the Gulf, voice messages speed supplies, transmit drilling and weather reports, keep the job rolling. Cost of the G-E equipment is low. One unit *pays for itself when it saves as little as 2 hours shutdown time.*

● General Electric's Communications Advisory Service is in action throughout the oil and gas industry. It saves time and money for explorers, drillers, producers, well servicers, pipeline builders and operators. Ask the General Electric Communications Man at our office near you for complete information. Meanwhile, the coupon below will bring you literature on this subject.

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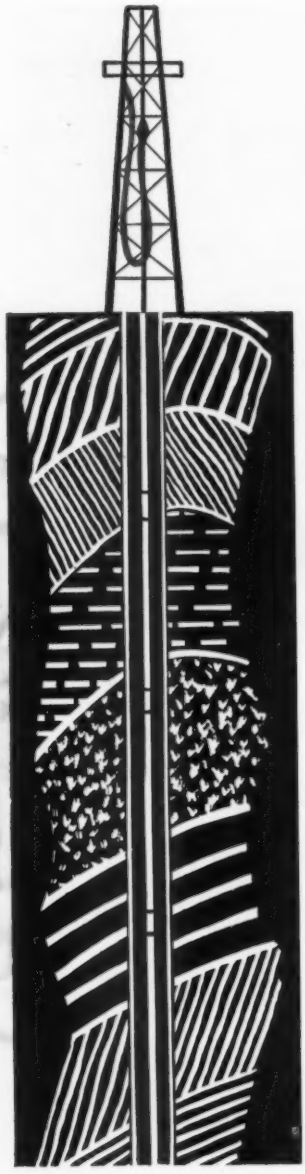

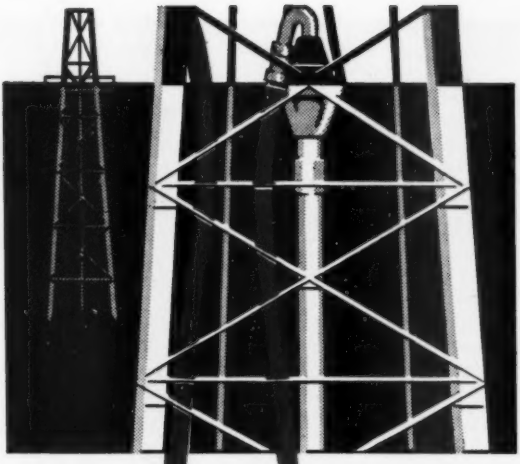

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Ray-Man Rotary Hose stays with the rig. Features which lengthen the life of Ray-Man Hose add more miles of drilling for every dollar you invest. Oil-proof, gas-proof, and abrasive resistant, the exclusive Flexlastic tube can be used for all methods of drilling. Engineered flexibility in the hose reduces danger of damage and contributes to longer life • The built-in Type "E" Coupling with "Lip-Lok" Pressure Sealing Flange is another R/M feature which adds miles of drilling life to your rotary hose. This coupling has been field tested in every major oil field in the United States . . . and proved SAFE! • Details of Ray-Man Rotary Hose construction may be obtained by writing for Bulletin 6898.

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RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks
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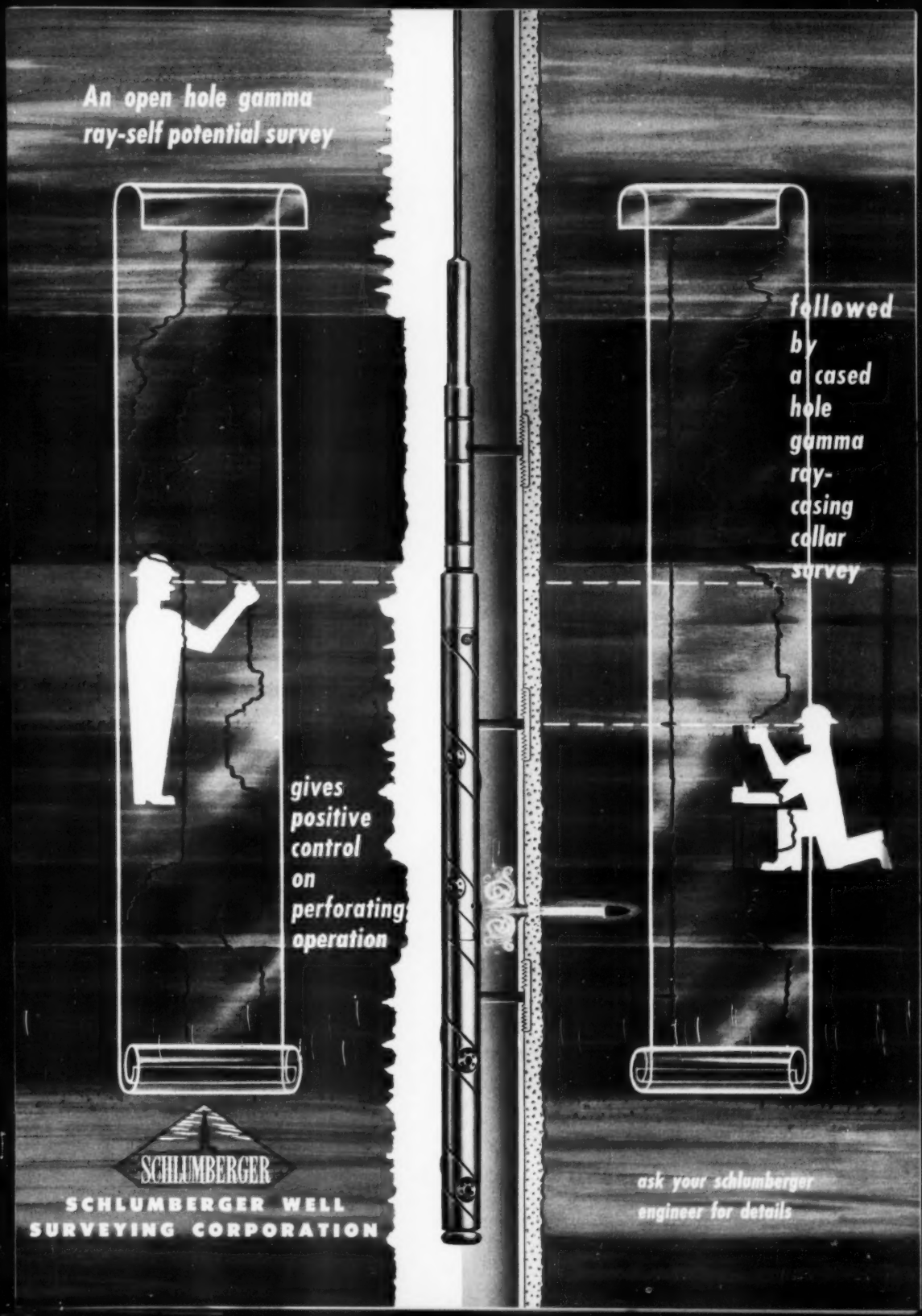
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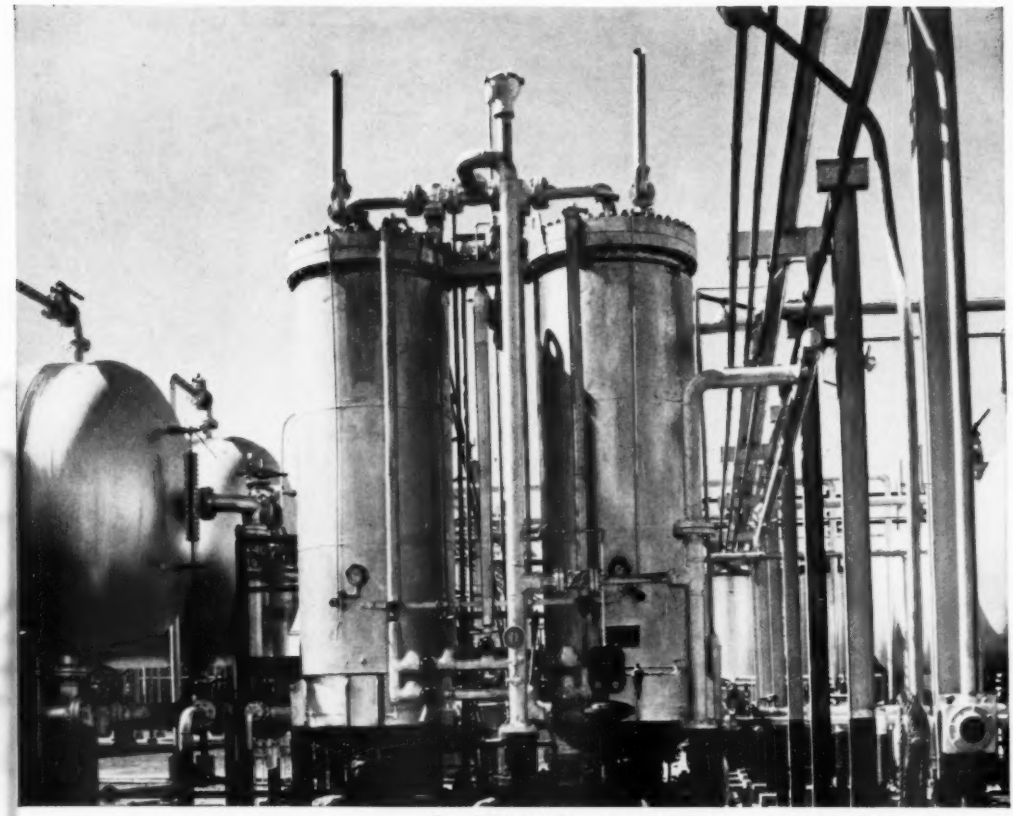

Type BWC-3500 Lectrodryer at Shell Oil Company plant, Notrees, Texas.

DRYing propane at SHELL

Lectrodryers catch the moisture which separators and filters let by, DRYing hydrocarbons in either the liquid or gaseous stage. In this Shell Oil Company installation, liquid propane is processed.

Hydrocarbons for chlorination must be DRY, to prevent vicious attack of the steel in the chlorinators. Lectrodryers are placed on-stream to DRY them, therefore, as they pass on for further processing.

Hydrocarbons must be DRY before being fed into reactions where HF is the catalyst. And, in many cases, the purchaser specifies a DRY hydrocarbon for reasons of his own. Lectrodryers are doing all those DRYing jobs.

You can get extreme DRYness with Lectrodryers —down to 3 to 4 parts per million or less. Our engineers will help you lay out the system and select the proper equipment. For this help, write Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
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In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
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WITH ACTIVATED ALUMINAS

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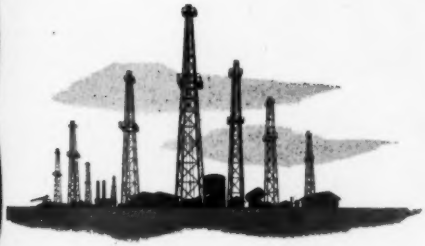
Oil men never take chain for granted!



From drill rig to refinery, through production and transportation, oil men demand chain that they can depend on. That's why leading oil producers specify Campbell Chain . . . chain that is inspected link by link before it leaves the factory. This is Campbell's guarantee that the chain is safe and sure.

Hundreds of other industries—among them mining, manufacturing, transportation, agriculture—look to Campbell for the right chain to fit their specific needs. Years of reliable performance have proved the long-lasting dependability of Campbell Chain.

When you need chain, for any purpose . . . in any grade, be sure to order it by the name—Campbell. Or, when you have an unusual problem involving chain, call the Campbell representative in your area. Take advantage of his experience.

Chain for every need . . . INDUSTRIAL . . . MARINE . . . FARM . . . AUTOMOTIVE

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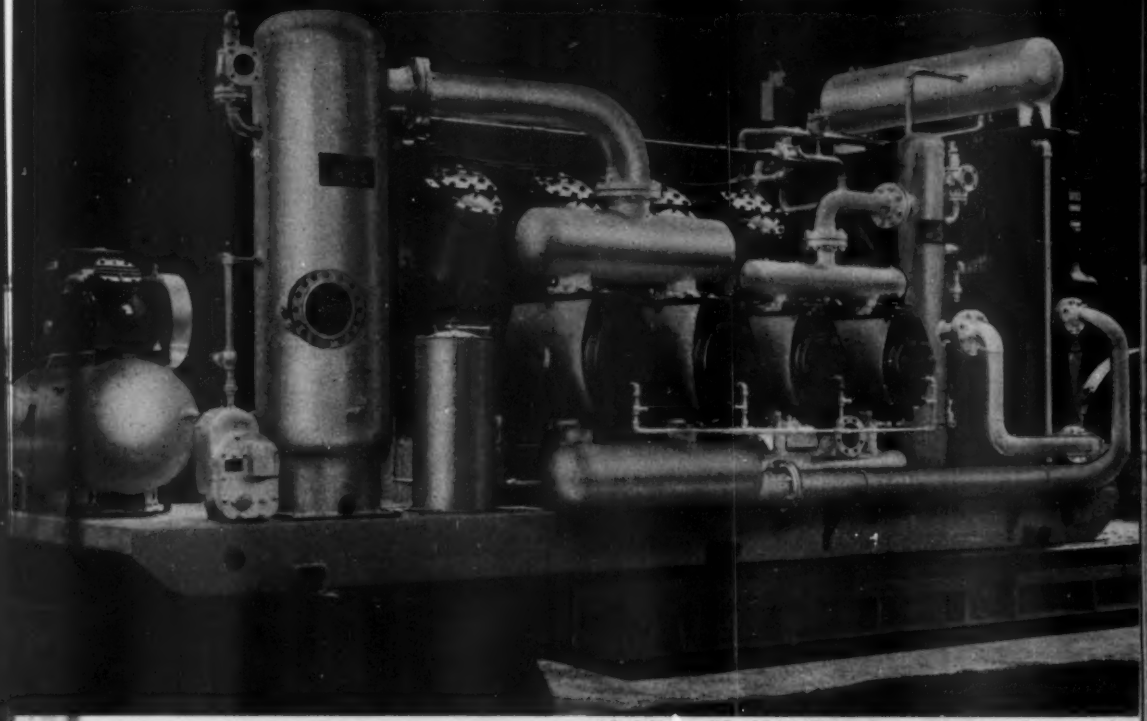
Complete Packaging Saves You Money

ON YOUR BEAIRD-INGERSOLL-RAND PACKAGED COMPRESSOR PLANT



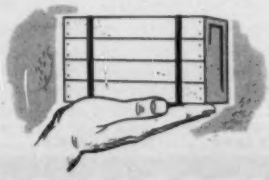
A Beaird-Ingersoll-Rand 8 JVG 220 horsepower two-stage packaged compressor plant. Other models available from 110 to 550 horsepower.

YOU RECEIVE A COMPLETE PLANT, including every component, connection and control you would expect in a large stationary compressor plant. The Beaird-Ingersoll-Rand packaged compressor plant is designed specifically to meet your operating requirements . . . gas engineered as well as mechanically engineered . . . completely assembled . . . and mounted on a rugged steel base. It may be transported directly to your location as a unit, requiring only a minimum amount of field installation. If your field conditions should change, the plant can be moved intact to a new location at a big saving in re-installation costs.

It is also economical to operate. You do not need a specially trained compressor operator, as little more than routine daily servicing is required.

Let us show you how you will save by installing a Beaird-Ingersoll-Rand packaged compressor plant.

For use in: gas lift, field gas gathering, flare gas collection, repressuring.



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● Whether you need a 4", 10,000 lb. working pressure, all-stainless master valve or one hundred 2", 500 lb. flow line valves, call McEvoy for prompt delivery.

The reason is simple. Even though the demand for this outstanding valve has been rising rapidly, we have been engaged in an all-out program of expanding manufacturing facilities and contracting for materials.

Now we have a complete line of valves, good inventories and a streamlined plant that can turn out special orders in a matter of hours. You can order with complete assurance of prompt delivery.

Many operators call the McEvoy Automatic Lubrication Conduit Gate Valve the finest ever made. Write or wire for price and delivery quotations.

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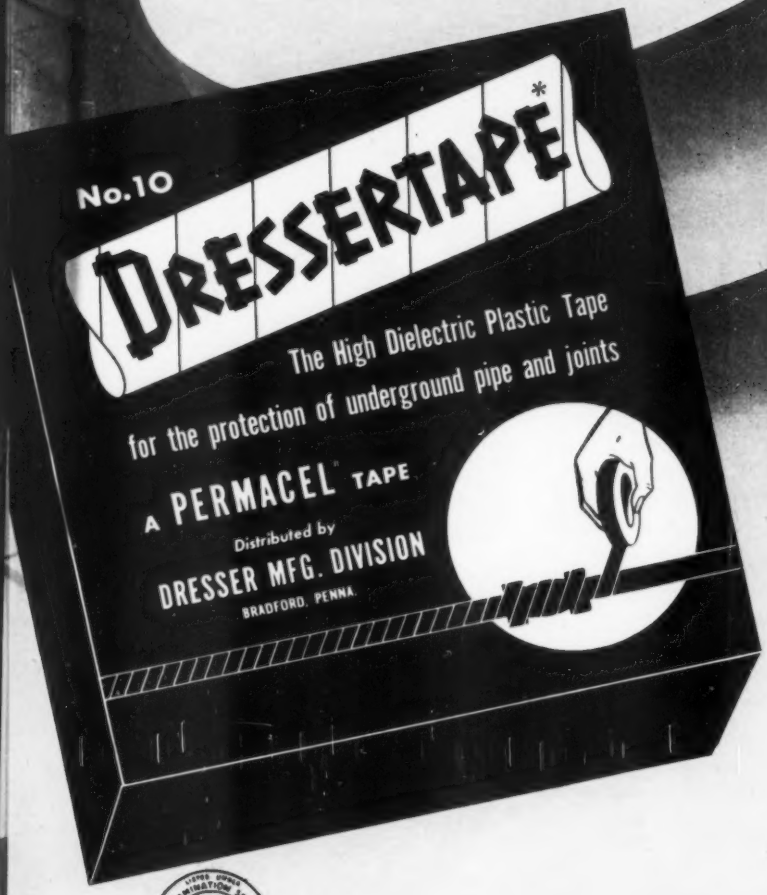
Introducing



- Easy and clean to apply—any weather.
- Applied cold—no heating equipment required.
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- Uniform coating—top, bottom, sides, equally protected.
- Provides protection equal to or exceeding that of yard or mill-wrapped pipe.
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- Sticks at a touch to any clean surface or itself.—Pressure-sensitive.
- Speed and simplicity give lower overall costs.
- Lasting protection against water, oil and soil chemicals.
- Can be applied over other coatings.

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*DRESSERTAPE IS A TRADE MARK OF DRESSER MFG. DIV.

a pipe tape of DRESSER quality—

DRESSERTAPE*

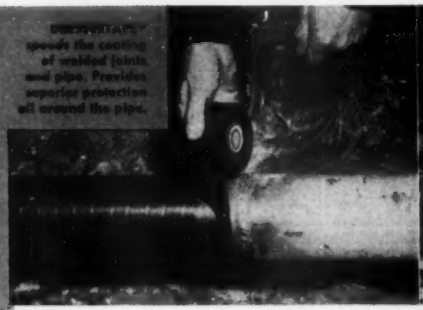
Dresser's association with the gas and oil industries—through the design and manufacture of high quality pipe joining and repair products—extends over more than half a century.

Their piping problems have been Dresser's problems, and one of the most serious of these has been *corrosion*. Dresser Laboratories have carried on continuing tests on this important subject, seeking better methods for the protection of underground pipe.

As a result of this intensive research, Dresser now offers a plastic tape of exceptional chemical, physical and electrical properties—DRESSERTAPE.*

It is available in rolls and takes its place as a faster, simpler, more effective method of stopping corrosion and extending the life of underground pipe and joints.

Try DRESSERTAPE* *yourself—Place an order today!*



DRESSERTAPE* speeds the coating of welded joints and pipe. Provides superior protection all around the pipe.

Properties of DRESSERTAPE* No. 10

Dressertape* is a black, polyvinyl chloride film tape with high adhesive firmness, extra strength, sunlight resistance and excellent aging qualities. It provides effective protection against water, salt water, acids, alkalies, oil, and soil chemicals.

Thickness, overall	.010"
Elongation at break	200%
Dielectric strength	10,000 volts
Insulation resistance	100,000 Megohms
Tensile strength	30 lbs. per inch
Adhesion	30 oz. per inch
Operating temperature	Up to 200°F.

DRESSERTAPE* protects service pipe at a critical spot—where it passes through a basement wall.

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Sales Offices: New York, Chicago, Philadelphia, Houston, South San Francisco
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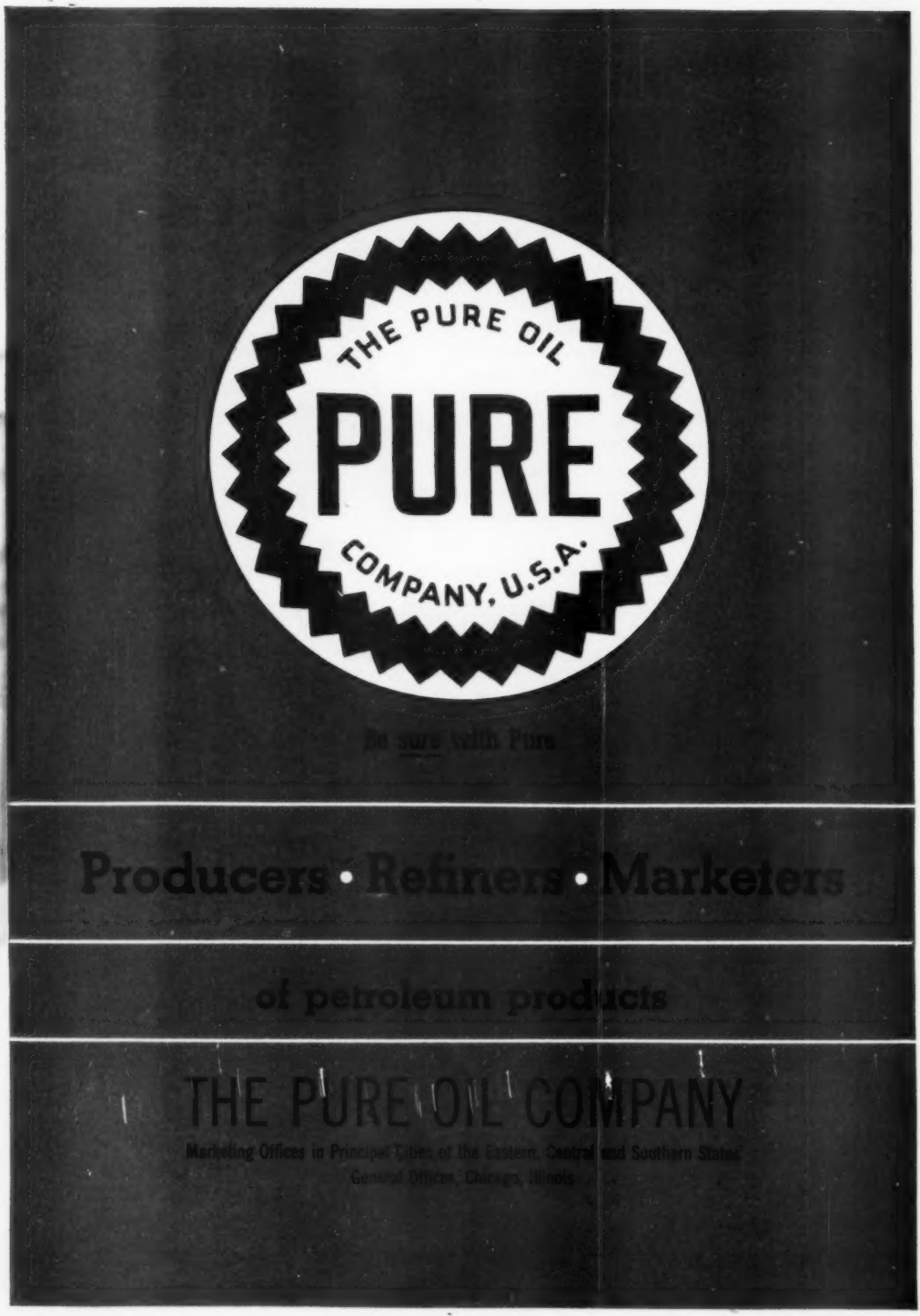
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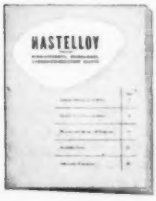
handles *Boiling HCl* for 2½ years!

This HASTELLOY Alloy Condenser is still on the job in 1-10% Acid Solution

The 28 in. tubes in this condenser for the distillation of hydrochloric acid are made from ½-in. diameter, 16-gage welded tubing of HASTELLOY alloy B. The end disks, which are ⅜ in. thick by 7 in. in diameter, are also of the nickel-base alloy.

For complete information, write for the 40-page booklet, "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys." It contains data on the properties, available forms, and fabricating techniques for all three grades of HASTELLOY alloy.

This condenser, made of HASTELLOY alloy B, shows no signs of corrosion after two and one-half years in a vacuum still for the distillation of hydrochloric acid. Since it was installed, the unit has been in operation two to three days a week, eight hours a day, handling a dilute solution of the corrosive acid at temperatures up to the boiling point.

HASTELLOY alloy B is one of the few commercially available materials that can handle boiling hydrochloric acid—one of the most severely corrosive agents known to the chemical industry. Alloy B is available in all standard wrought forms and can be fabricated by most common methods. Two additional HASTELLOY alloys, designated as C and D, are also available for handling other highly corrosive chemicals, such as sulphuric acid and certain strong oxidizing agents, like ferric chloride and wet chlorine.

HAYNES TRADE-MARK *Alloys*

"Hastelloy" and "Haynes" are trade-marks of Union Carbide and Carbon Corporation.

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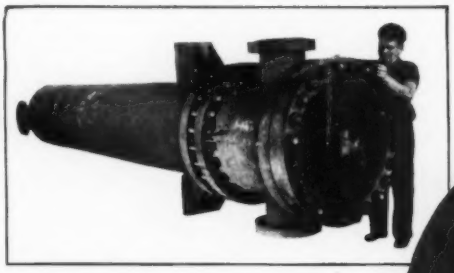

High-level reactor exchanger built for one of the world's largest Ethanol plants, showing copper-lined channel and removable copper pass rib with unusual reinforcement designed to give support against high pressure drop at elevated temperatures.

How A.O.Smith protected heat transfer equipment from the effects of Phosphoric Acid Corrosion and Hydrogen Diffusion

The problem was solved for Stone & Webster Engineering Corporation of Boston, engineers and designers of the Chemical Project of the British Petroleum Chemicals, Ltd., at Grangemouth, Scotland, with this deoxidized copper-lined, high-level reactor exchanger.

Our metallurgical laboratories ran tests on various materials in collaboration with Stone & Webster Engineering Corporation and Shell Development Company, the process licensor, which aided them in establishing deoxidized copper as the most suitable material for the protective lining.

Our welding laboratories then determined procedures to be used in the shop for welding copper to copper, copper to steel, and silver-soldering copper to steel.

Combining all laboratory assistance with the experience of the A.O. Smith heat transfer and mechanical design groups made production of this unit possible.

A.O. Smith has been retained as consultants on today's most complex heat transfer problems and the facilities employed in solving them are available to you.

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They Say—

Taxes and Industry

"Since 1913 when the first federal income-tax law was enacted, the individual income-tax rate has risen from 1 per cent with a maximum rate of 7 per cent on net income of $500,000 and over to a starting rate of 22.2 per cent with a combined normal and surtax rate of 92 per cent on taxable income of $200,000 and over. The corporate income-tax rate has risen from 1 per cent to a combined normal, surtax, and excess-profits maximum rate of 82 per cent.

"The trend of rates is ever upward. Unless it is stopped, there will be no earnings, after taxes, to put back into the business, and no industrial growth for private enterprise in any line of endeavor, either by corporations or individuals."

Annual report of Richfield Oil Corp.

No Rationing Ahead

"With curtailment in the output of automobiles and other oil-consuming equipment, it is probable that domestic oil demand during 1952 will gain only around 5 per cent, as compared with about 9 per cent last year.

"Meeting that demand, including defense needs, will again require full use of facilities, but we foresee no need for civilian rationing."

Annual report of Standard Oil Co. (Ind.).

Examples Important

"If the head of the company is an autocrat, there will be little autocrats all through the company. If the boss uses his position to feather his own financial nest, you may be sure that the office boy is swiping postage stamps."

R. L. Minckler, president, General Petroleum Corp., addressing Las Angeles Chapter of National Safety Council.

Necessary Restraint

"As conservation commissioner of Louisiana I recognize the necessity for some sovereign or police power regulation of the development and production of oil and gas. However, I favor a minimum of government interference and restriction and like to depend as much as possible upon the cooperation by the members of the industry."

"All of you gentlemen have at some time had experience in flying a kite and you know that when the kite string which is the restraining influence breaks the kite will fall. It is my experience that the development of our natural resources requires some restraining influence in order to keep the development in balance

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Extra easy to carry and put on pipe

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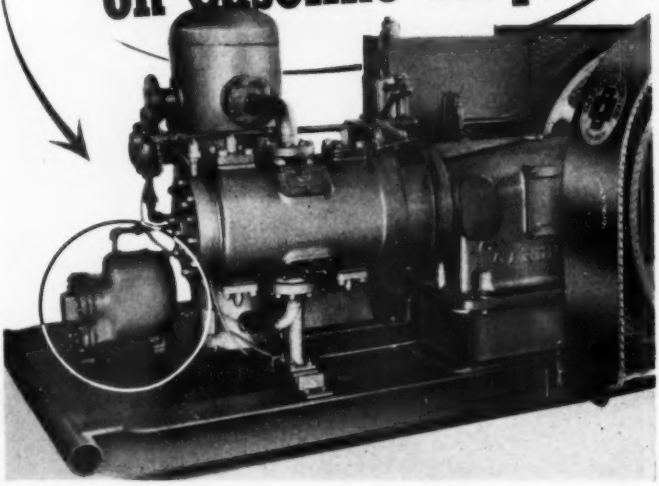
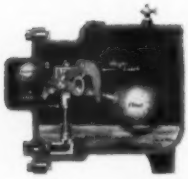
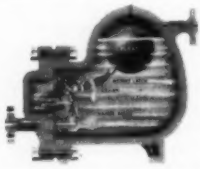


These Widely Specified Weight-Operated Traps Are Now Serving Many Uses in Natural Gas Industry



Model WO, for press. to 650 lbs.



Model C, for press. to 1500 lbs.

Pictured above, a Nicholson weight-operated trap on a compressor designed for booster, gas lift and repressuring service. It drains gasoline from the scrubber head. Some other common uses of Nicholson gasoline, steam, water traps:

Discharge gasoline and oil from gas well separators, accumulators, after-absorbers, compressor suction lines.

Drain gasoline and moisture forming in low places of field gas lines.

Discharge water collected out of the gas condensate in package and smaller natural gasoline plants.

Also discharge steam condensate from heaters, separators, accumulators and scrubbers in the process stream.

This 32-Page Standard Reference Describes Traps For All Mediums And Pressures

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and to maintain pure conservation by the elimination of waste and the prevention of the drilling of unnecessary wells."

S. L. Digby, Louisiana conservation commissioner, addressing the southwestern district meeting of the American Petroleum Institute's Division of Production, Shreveport.

Unfulfilled Promises

"Events are showing that the rest of the world can manage without Persian oil much more successfully than Persia can get along without the prop to her economy provided by Anglo-Iranian Oil Co. . . .

"Dr. Mossadegh is proving the truth in the saying that he who would ride on a tiger cannot dismount. He rode to power on the hysterical clamor of a mob, now he is obliged to keep the mob clamorous.

"The wild promises of the dazzling benefits that oil nationalization would bring to Persia are unfulfilled and unfulfillable."

Editorial in the Manchester (England) Guardian.

CALENDAR

April

Missouri Liquefied Petroleum Gas Association, Hotel President, Kansas City, Mo., April 7-9.

American Society of Lubrication Engineers, annual meeting, Statler Hotel, Cleveland, April 7-9.

Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill., April 10.

Arizona Geological Society of America, forty-eighth annual meeting, University of Arizona campus, Tucson, Ariz., April 11-12.

Petroleum Industry Electrical Association and Petroleum Electrical Supply Association, twenty-fourth annual joint conference, Mayo Hotel, Tulsa, April 14-17.

American Institute of Electrical Engineers, District 7 meeting, Hotel Jefferson, St. Louis, April 15-17.

Association of American State Geologists, annual meeting, Tallahassee, Fla., April 15-19.

National Petroleum Association, semiannual meeting, Hotel Cleveland, Cleveland, April 16-18.

American Petroleum Institute, Division of Transportation, pipe-line conference, Blackstone Hotel, Fort Worth, April 21-23.

American Petroleum Institute, safety and fire-protection committees, Hotel Texas, Fort Worth, April 21-24.

National Petroleum Council, conference rooms A and B of the Interior Department Auditorium, Washington, D. C., April 22.

American Petroleum Institute, Division of Production, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., April 24-25.

Indiana Gas Association, annual meeting, French Lick Springs Hotel, French Lick, Ind., April 24-25.

Ardmore Geological Society, field trip, East of Ardmore and South of the Arbuckle Mountains, April 25-26.

Independent Petroleum Association of America, midyear meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 28-29.

American Oil Chemists' Society, spring meeting, Shamrock Hotel, Houston, April 29-30.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

American Institute of Electrical Engineers, District 1 meeting, Binghampton, N. Y., April 30-May 2.

Natural Gasoline Association of America,

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FOR LOWER COST PER FOOT OF HOLE DRILLED

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TYPE OSS — For medium non-abrasive shales interspersed with streaks of harder formations.

TYPE AB — A general purpose bit for medium and medium-hard formations.

TYPE C — For hard rock formations.

TYPE CT — Long tooth bit for soft formations.

TYPE OSN — For medium non-abrasive shales.

TYPE OW — A general purpose bit for drilling in medium formation.

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TYPE CFF — For hard rock formations interspersed with extremely hard abrasive streaks.

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annual meeting, Rice Hotel, Houston, April 30-May 2.

May

Southeastern Section Geological Society of America, and Southeastern Mineral Symposium, joint meeting, Hotel Roanoke, Roanoke, Va., May 1-3.

National Air Pollution Symposium, Huntington Hotel, Pasadena, Calif., May 5-6.

American Geophysical Union, thirty-third annual meeting, National Academy of Sciences, National Research Council, Washington, D. C., May 5-7.

Texas Petroleum Research Committee, Fourth Oil Recovery Conference, Austin, Tex., May 8-9.

Interstate Oil Compact Commission, spring meeting, Phoenix, Ariz., May 9-10.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Association of Petroleum Geologists, regional meeting, Mayo Hotel, Tulsa, May 12-13.

American Gas Association, Natural Gas Department, spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

Annual Liquefied Petroleum Gas Association convention and trade show, Palmer House, Chicago, May 12-14.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

Pennsylvania Gas Association, Wernersville, Pa., May 13-15.

Intermountain Association of Petroleum Geologists, Third Annual Field Conference, the Basin and Range Province from Cedar City, Utah, to Las Vegas, Nev., May 13-16.

American Petroleum Institute, Division of Production, Pacific Coast district, Biltmore Hotel, Los Angeles, May 15-16.

American Petroleum Institute, division of marketing, midyear meeting, Copley Plaza, Boston, May 19-20.

Gas Appliance Manufacturers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo., May 21-23.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, May 27-29.

Society of Exploration Geophysicists, Gulf Coast regional meeting, Rice Hotel, Houston, May 29-30.

Seventh annual short course in gas technology, sponsored by the Southern Gas Association, Texas College of Arts and Industries, Kingsville, Tex., May 28-30.

June

Society of Automotive Engineers, summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J., June 1-6.

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn Pittsburgh, June 5-6.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver, June 9-14.

Western Petroleum Refiners Association, regional technical and industrial-relations meeting, Broadview Hotel, Wichita, Kans., June 12-13.

International Gas Conference, Brussels, Belgium, June 16-22.

Kentucky Oil and Gas Association, annual meeting, Hotel Lafayette and Phoenix Hotel, Lexington, Ky., June 19-20.

Petroleum Equipment Suppliers Association, Mark Hopkins Hotel, San Francisco, June 22-25.

Michigan Gas Association, annual meeting, Grand Hotel, Mackinac Island, Mich., June 23-24.

American Society for Testing Materials annual meeting, Hotel Statler, New York, June 23-27.

American Institute of Electrical Engineers, summer general meeting, Nicollet Hotel, Minneapolis, Minn., June 23-27.

August

Wyoming Geological Association, field trip, Big Horn Basin, August 1-3.

Society of Automotive Engineers, national

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NATURAL GASOLINE MEN

GREETINGS

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NATURAL GASOLINE SUPPLY MEN'S ASSOCIATION

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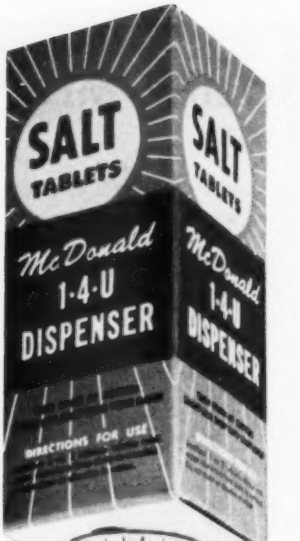

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West Coast meeting, Fairmont Hotel, San Francisco, August 11-13.

American Institute of Electrical Engineers Pacific general meeting, Westward Ho Hotel, Phoenix, Ariz., August 19-22

September

Pacific Coast Gas Association, Ambassador Hotel, Los Angeles, September 3-5.

Instrument Society of America, seventh national instrument conference and exhibit, Cleveland, September 6-12.

National Petroleum Association, fiftieth annual meeting, Hotel Traymore, Atlantic City, N. J., September 10-12.

American Institute of Chemical Engineers regional meeting, Palmer House, Chicago September 11-13.

Western Petroleum Refiners Association regional meeting, Hotel Henning, Casper, Wyo., September 25-26.

American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel Oklahoma City, September 28-30

October

Independent Natural Gas Association of America, annual meeting, Fontenelle Hotel Omaha, Neb., October 6.

California Natural Gasoline Association twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles, October 9-10

Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth, October 13-15.

American Institute of Electrical Engineers fall meeting, New Orleans, October 13-17.

Natural Gasoline Association of America southern regional meeting, Blackstone Hotel, Tyler, Tex., October 19.

Independent Petroleum Association of America, annual meeting, Mayo Hotel Tulsa, October 20-21.

Society of Automotive Engineers, national transportation meeting, Hotel William Penn Pittsburgh, Pa., October 22-24.

American Gas Association, annual convention, Atlantic City, N. J., October 27-30.

American Gas Association, annual convention, Atlantic City, N. J., October 27-30

November

Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, November 3-4.

Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa, November 6-7.

Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex., November 6-8.

Oil Industry Information Committee, Conrad Hilton Hotel, Chicago, November 8-13.

American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago, November 10-13.

Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth, November 13-14.

American Society of Mechanical Engineers, Statler Hotel, New York City, November 30-December 5.

December

Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex., December 7.

American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland, December 7-10.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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2 Chrome ½ Moly • 2-¼ Chrome 1 Moly
5 Chrome ½ Moly • 7 Chrome ½ Moly
9 Chrome 1 Moly
A1S1 1335 • A1S1 2317 • A1S1 2512 •
A1S1 4130, 4140 • A1S1 4615 • A1S1 8615,
8620, 8630, 8635, 8640 • 7% Ni. • 9% Ni.

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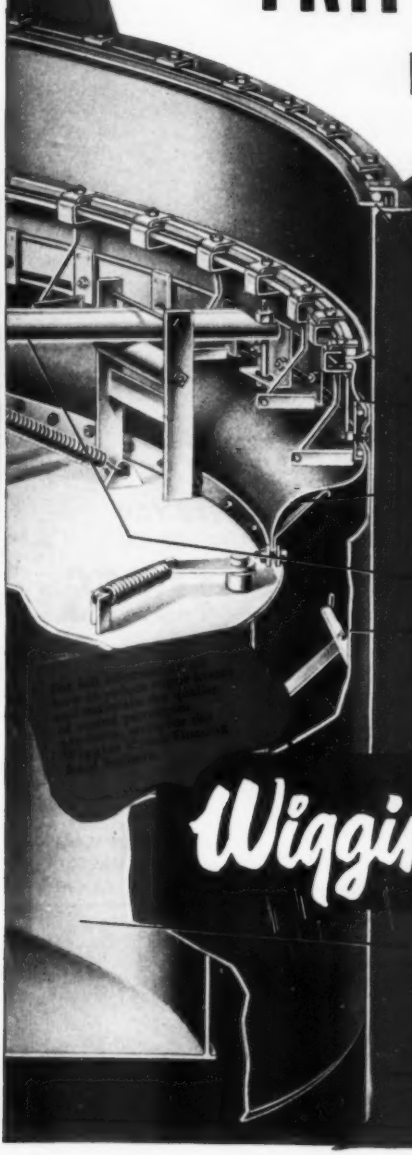

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THE OIL AND GAS

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●

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JOURNALLY Speaking

Blame the Guv'ment

HOW'S your local mail service? Do you get your copy of our favorite oil publication bright and early every Monday? If you don't, the fault lies right in your local post office, and you ought to raise cain about it.

We have just made a survey which reveals that too many of our readers are getting the Big Yellow Book later than they should—and which proves conclusively that the fault lies in the delivery end.

Take Corpus Christi, for example. At our request, 16 of our subscribers, selected at random, reported on the receipt of a recent issue. Three of these picked up their copies on Sunday by going to their post office lock boxes, and this proves that the magazines got there on schedule because all of them left Tulsa in the same mail sack. But only three got carrier delivery on Monday, seven on Tuesday, two on Wednesday, and one didn't get delivery until Thursday. So the trouble lies entirely in the Corpus Christi post office.

But Corpus is no isolated example. Things are even worse in Washington, D. C., right under the nose of the Postmaster General. We sampled 16 subscribers there, too, and found this: One picked up his copy at the post office Sunday, two got delivery Monday, none at all on Tuesday, seven on Wednesday, and six on Thursday. Where were all those copies during the first part of the week? Just kicking around the post office, obviously.

It's pretty much the same sad story all over the country, though there are a few bright spots. Our sample check showed 100 per cent Monday delivery in Whiting and Cleveland, and 92 per cent in Denver.

Worst spot is the New York metropolitan area, including the North Jersey refinery towns. Of 37 subscribers sampled, 3 got Monday delivery (proving that the train arrived on schedule) but all the rest had to wait until later in the week. On the West Coast we found that about half the copies are delivered on Monday and the rest dribble along throughout the week.

So what? Sure the service is lousy, but what can we do about it? Well, if you don't give a durn when you get your mail, don't do anything. But if you think the service could be improved, why rear up on your hind legs and holler. Write your congressman, write the Postmaster General, squawk to your mail carrier. Best of all, complain to your local postmaster. We've found that this last suggestion works. Postmasters are human (really), and like to hear from their "customers." And it's a good old rule that the squeaky wheel gets the grease.

We're really serious about this request that you complain to your postmaster. We've talked to some and they say that the only way they can get more trucks, racks, and other needed equipment out of the red-tape boys in Washington is to show visible proof that the enraged citizenry is up in arms about the poor quality of the local delivery service.

You don't need to be embarrassed about it, either. The best curbstone definition of democracy we ever heard was that it's the right to complain about the government.

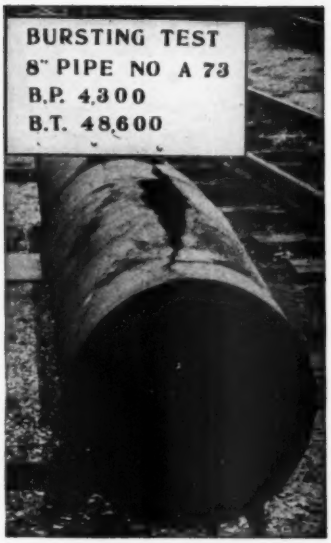
Discovery Day

NORTH DAKOTA is not taking lightly its responsibility as the newest oil-producing state. While the rest of the country will wait until fall to observe Oil Progress Week, those Sioux Staters staged a mammoth celebration at Williston April 5 to mark the first anniversary of the discovery of oil.

According to the advance billing, Williston's Discovery Day shindig included a Fifty Years of Progress Parade, a beauty queen, a display of oil equipment, a speech by the governor, balloons and whistles for the kiddies, and free entertainment for the entire family. Amerada Petroleum Corp., which brought in the discovery well, scheduled a free barbecue and promised beef for 10,000 people and samples of crude oil for 5,000 people. We can't explain the discrepancy there. Maybe Amerada figured that half the people would take everything, including the barbecue, on faith, but the other half of those skeptical wheat growers would have to have tangible proof before they would believe that there really is oil down underneath those big windmill-like things.

—*Henry D. Ralph.*

CRUSHING TEST: Ductile iron pipe sections, tested to fracture in compression, reveal the superior ductility of this new engineering material. Its strength and toughness make ductile iron an excellent material for tubular products. The average ring modulus of rupture on 8" diameter rings so tested by Underwriters Laboratories was 127,650 p.s.i. Photographs shown here were furnished by Lynchburg Foundry Company, Lynchburg, Va.



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Vol. 50, No. 48

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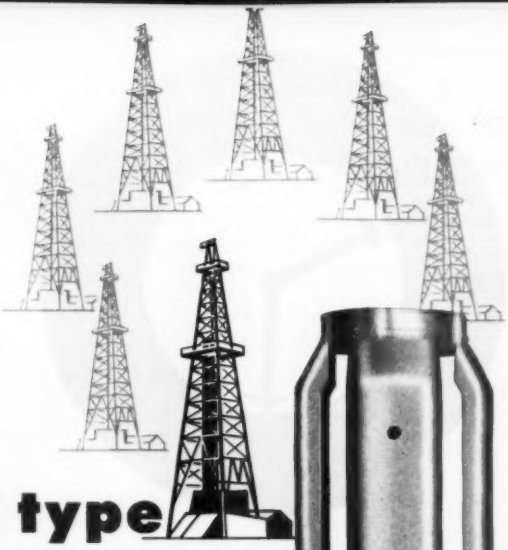

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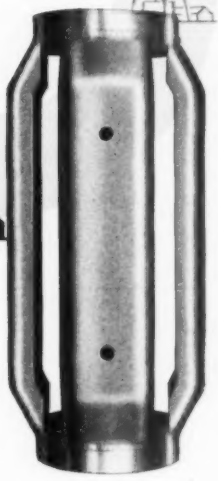

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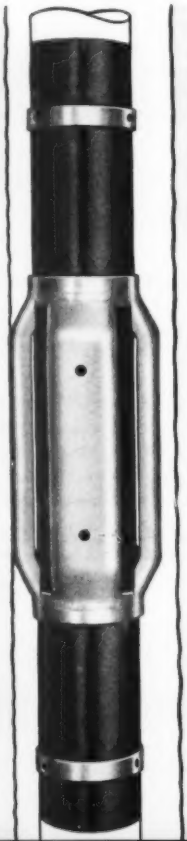

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FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

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The steel mess foreshadows trouble for oil

THE oil industry, and all others, can view with nothing but pessimism and alarm the deterioration of the government machinery for economic stabilization. The long deadlock over steel-wage negotiations and the resignation of Charles E. Wilson as chief mobilizer because of his disgust at the intrusion of politics are indications of what industry may expect in an election year.

If the steel case sets the pattern for so-called stabilization, then there is plenty of trouble ahead for petroleum.

Prices and wages were supposed to be frozen for the emergency except for limited adjustments up to a specified ceiling. Steel workers demanded that the wage ceiling be broken through, but steel companies insisted this is impossible without higher prices. It was generally agreed that the public interest would be served best by no increase in either wages or prices.

THEN political considerations dictated a substantial increase in steel wages, completely disrupting the stabilization program. Steel makers were led to believe that they could get a compensating increase in prices. But on the final showdown the administration decided it would be bad politics to let prices go up in an election year, regardless of costs.

This sort of political opportunism makes a travesty of "stabilization." It has started an exodus of able businessmen from government service. Congress, alarmed at the turn of events, has suspended consideration of a bill to continue the stabilization law.

PETROLEUM is next on the list. Oil workers want more income—as who doesn't? They are no doubt pinched by the inflationary trend, but so is every other element of the economy. Oil companies want higher prices even with present wage scales, and they will fight any increase in their costs not compensated by higher prices. Last year's oil profits are no measure of the ability to absorb next year's costs by any standard except that of politics.

Let's have either a completely stabilized economy or a completely free economy. Stabilization can work, during a period of national emergency, if it has a certain amount of flexibility within definite standards. But the flexibility cannot be all in one direction, nor for the benefit of special interests.

FOR Congress, the proper course now is to take a firm stand and either abolish economic controls entirely or write a new law with definite standards and no loopholes for political shenanigans.

For oil-industry men serving temporarily in government posts, the proper course is to continue to fight for fair and equitable treatment for the industry and nation even at great cost in personal sacrifice. To throw in the sponge now would mean a complete surrender to political pressures.

THIS WEEK

READY AND WAITING.—Mothballed against the time when its services may be needed, this pumping unit stands idle in the Navy's Elk Hills field. The engine and reduction gears of this shallow-pumping unit are "pickled" by inhibited lube oils. Rods and tubing are already in all field wells requiring pumping so that only a minimum of time will be necessary to start them producing. California operators would like to see the field opened now. (See West Coast.)

REFINING.—Sun Oil Co. announces $110,000,000 expansion program for 1952, much of which will be devoted to refining facilities. . . . Sun plans new refinery at Sarnia, petrochemical facilities at Marcus Hook, and expansion at Toledo. . . . ¶Strike of Tide Water refinery at Bayonne reported near settlement. . . . Refinery idle since January 7. . . . ¶Refiners at W.P.R.A. meeting agree octane ratings will go up this summer, regaining all ground lost as a result of restrictions on use of TEL. . . . ¶Famariss Oil & Refining buys Monument, N. M., refinery of Warren Petroleum. . . . ¶Midland Cooperative lets contracts for $3,500,000 expansion of Cushing, Okla., refinery.

PIPE LINE.—Alberta board recommends approval of Westcoast Transmission application for permit to export gas from province. . . . Company plans line from Peace River area to Pacific Northwest of United States. . . . Action not final since provincial government must concur. . . . ¶First shipment of crude through 355-mile Ohio Oil Co. line from Wood River to Lima received. . . . Northern Natural files FPC application for construction of 400-mile, 24-in. gas line from U.S.-Canadian border to Minneapolis. . . . Project would cost $24,590,000. . . . ¶Interstate lets contract for construction of 32-mile, 20-in. crude line in Louisiana. . . .

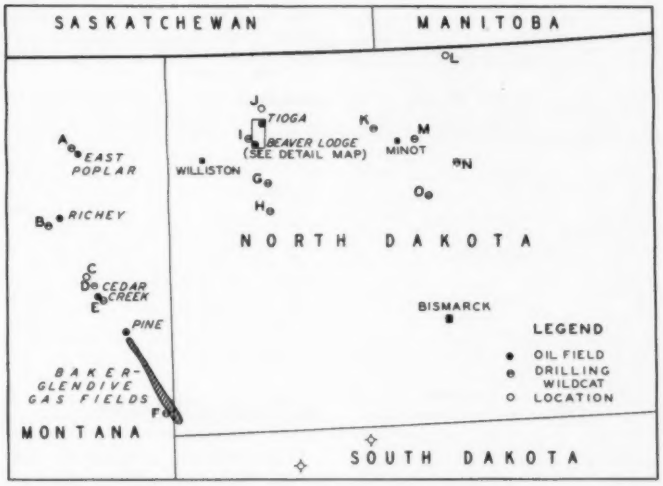
INDUSTRY.—Ernest Thompson predicts increase in price of crude oil in near future. . . . Thinks new head of OPS will prove to be "more realistic." . . . ¶Sale of controlling interest in Carl B. King Drilling Co. revealed. . . . ¶First major successful deep wildcat in Delaware basin of West Texas to be completed as gasser below 9,000 ft. . . . ¶Good public-information program can cure most of oil industry's problems, speakers tell North Texas association. . . . Principal problems listed as attack on depletion allowance, attempt to break up integrated companies, stalemate on tidelands development. . . .

DEVELOPMENT.—The Texas Co. well apparently links California's Honor Rancho and Castaic Hills fields. . . . Well, an extensioner to Honor Rancho, finds good production from pay zone of Castaic Hills. . . . ¶Unitization, whether early or late in development of a field, provides higher ultimate recovery at lower costs, North Texas Oil and Gas Association told. . . . ¶Water floods, often producing more than primary production, should get pick of personnel. . . . ¶Williston basin claims seven proven oil areas as it passes the first anniversary of discovery of oil in the basin. . . . Forty locations now active, and prospects are that activity will continue to increase. . . .

INTERNATIONAL.—First shipment of Kirkuk field oil reaches Mediterranean coast through new I.P.C. 30-32-in. line. . . . Initial tanker shipments to begin in another week. . . . First movement of oil breaks original schedule by 6 months. . . . ¶Kuwait sheik announces 15-year plan to rebuild Kuwait town. . . . ¶Italian government committee recommends that no construction of additional refining capacity be permitted, since present capacity considered more than adequate for domestic requirements. . . . ¶Anglo-Iranian commissions first electronically controlled refinery unit. . . . Unit is in company's Llandarcy, South Wales, refinery. . . . ¶Burmah Oil Co. announces plans for 10,000-bbl. Pakistan refinery. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,429,400 bbl. daily for week ended March 29, down 7,875 bbl. daily. . . . ¶Well completions for the week totaled 880 compared with 843 for previous week and 673 for the same week last year. . . . ¶Wildcat completions of 163 were 25 under previous week but 23 more than same week in 1951. . . . ¶Rotary Rigs operating in United States on March 31 decreased 12 rigs to 2,710. . . .

TRENDS.—Total well completions this year through March 29 averaged 870 wells per week compared with weekly average of 763 for the first 3 months in 1951. . . . Wildcat completions averaged 185 per week, an increase of 27 wells over the first quarter last year. . . .



BASIN ACTIVITY.—Here is the picture of drilling results since Williston's first strike, along with tests currently under way or staked.

Williston: 1 Year Old

First birthday of oil discovery in promising basin finds 7 proven areas, 40 active locations; activity to increase

Philip C. Ingalls

JUST 1 year ago April 4 there was no oil production in North Dakota and the hope for development of production in the near future hung on the outcome of a lone wildcat out in the middle of the Williston basin.

This wildcat, Amerada Petroleum Corp. 1 Clarence Iverson, 6-155n-95w, was bottomed at 11,744 ft. Two fruitless production tests had been made in the plan to begin at the bottom and test every likely looking zone on the way up the hole.

The Devonian zone at 11,630-60 ft. had been perforated and acidized for the third test in this wildcat, which most of the oil industry had already written off as another dry hole in North Dakota. Then it happened. The 1 Iverson, which had found no more than a show of oil while drilling the Devonian, kicked off and flowed 50°-gravity oil at a rate of 300 bbl. daily through a ¾-in. choke.

The excitement that this discovery started continues today, 1 year later. Acreage that had been considered of questionable value became overnight the most sought after wildcat acreage in the country. Lease and royalty buyers converged on Williston basin towns by the hundreds. and geophysical crews were soon to follow.

Hardly had the initial excitement begun to taper off when in July, over in the Montana portion of the basin, Shell Oil Co. 1 Richey (19-23n-50e) flowed oil on a drill-stem test of the Mississippian-Charles to give another shot in the arm to the high-pitched interest in the productive potentialities of the Williston basin.

About the same time Amerada had recompleted the 1 Iverson at 10,490-10,530 ft., still in the Devonian, for 200 bbl. of 40°-gravity oil daily with a gas-oil ratio of 1,000:1 in contrast to the 15,000:1 of the lower zone.

More strikes.—Other discoveries were soon to follow. In August, Amerada 1 Bakken, 12 miles north of 1 Iverson, flowed oil from the Mississippian-Madison to indicate the potentialities of what now appears to be the most important producing formation in the Williston basin.

In October Shell Oil Co. 1 Pine unit, 75 miles south and east of Richey; Amerada 1 Dilland, 1½ miles north of 1 Iverson; and C. H. Murphy 1 West Poplar unit, 35 miles north and east of Richey, indicated significant discoveries.

The following month came an oil recovery at The Texas Co. 1 Northern Pacific Railroad, 55 miles southeast of Richey, to indicate the seventh discovery in a basin that had been without production less than 1 year before.

The Texas Co. well (Cedar Creek) was completed in December for 254 bbl. of oil daily at 8,745-9,079 ft. in the basal Devonian or upper Ordovician. Shell's Richey well was initially completed in January for 1,656 bbl. of 38°-gravity oil daily from the Charles at 7,183-7,285 ft. Also in January Amerada brought in its 1 North Dakota "A," completing it for 521 bbl. of 52°-gravity oil daily from the Madison at about 8,400 ft., and Amerada 1 Iverson was plugged back to produce from the Madison. Though this wildcat had no shows of oil while penetrating the Madison, the currently producing zone at 8,520-28 ft. was to have been tested had production not been developed in a deeper zone. Shell's Pine unit well was completed in February for 467 bbl. of 33°-gravity oil in the Devonian topped at 8,512 ft.

Outlook today.—The volume and intensity of exploratory activity throughout the Williston basin during the past year has been just short of miraculous.

Today there are some 40 active well locations in the basin. The 15 wildcats are spread out over a large part of the central portion of the basin and along its western edge (see regional sketch map). Development is getting under way at the six initial discoveries with the greatest concentration of activity centering around Beaver Lodge field, scene of the initial discovery.

The current outlook for the Williston basin is one of acceleration both in exploratory and development activity. Development drilling in the apparently tremendous Beaver Lodge-Madison field is to be on 40-acre spacing, which means a slow spreading of clusters of wells centering around the present producing wells.

Dry holes, too.—Though the basin's wildcat success ratio has been phenomenal, by no means have all of the wildcats drilled been discoveries. Since 1 year ago today there have been more than 20 dry holes drilled in the Williston basin, most of them granite or near-granite tests.

South Dakota has yet to get a producing oil well. The two dry holes on the sketch map are indicative of the results to date. These two wildcats were drilled by Shell, the first two in a series of three. The northern portion of this state is considered very attractive because the objective formations are to be found at much shallower depths than to the north.

Here's a thumbnail sketch of the Williston basin wildcats shown on the regional sketch map:

Montana wildcats.—A. Carter Oil Co. 1 West Poplar, 18-29n-50e. This wildcat, now drilling below 7,300 ft.,

is an old hole originally completed dry at 5,051 ft. The Mississippian-Madison was topped at 6,100 ft. Drill-stem tests of this wildcat have failed to yield any oil and only small shows of gas. Also at A is **Ajax Oil Co.** 1 McGowan, 10-29n-50e, now drilling below 5,000 ft.

B. Shell Oil Co. 22-25B Northern Pacific Railroad, 25-22n-48e. This well is coring below 7,595 ft. Drill-stem tests taken between 5,000 and 7,500 ft. have yielded only traces of gas and oil. The Mississippian-Charles was identified at 6,800 ft.

C. The Texas Co. 1 Northern Pacific, 23-17n-53e, a location.

D. The Texas Co. 2-G Northern Pacific, 21-16n-54e, now drilling below 7,300 ft. This well has yet to indicate any oil or gas.

E. Empire State Oil Co. 1 Hathaway, 6-14n-55e, is now setting surface casing.

F. Shell Oil Co. 1 Little Beaver, 13-4n-61e, now drilling below 4,500 ft. Drill-stem tests have yielded brackish water.

Not shown on the map is The Texas Co. 1 Maciorski, 23-16n-50e, drilling below 9,180 ft. This well is about 16 miles northwest of Cedar Creek. The Madison was topped at 8,235 ft. Tests of the Charles Madison yielded sulfur water.

North Dakota wildcats.—G. Amerada 1 K. Halverson, 26-152n-96w, is testing the Madison above total depth of 9,705 ft. Plugged-back depth is 9,500 ft. This well had shows of oil on drill-stem tests of the Madison.

H. Amerada 1 Binhomer - Risser, 12-149n-96w. This wildcat was drilled to 13,773 ft. and casing was set at 11,700 ft. Top of the Devonian was called at 12,087 ft., the top of the Madison at 9,284 ft. This well had shows of oil but no significant drill-stem tests.

I. Champlin Refining Co. 1 Tank, 7-156n-96w. Now drilling off whipstock at 5,700 ft. with fish in hole. No recovery of oil.

J. Amerada 1 Skaar, 13-158n-95w, a location.

K. Wanette Oil Co. 1 Lee, 24-156n-85w, preparing to spud.

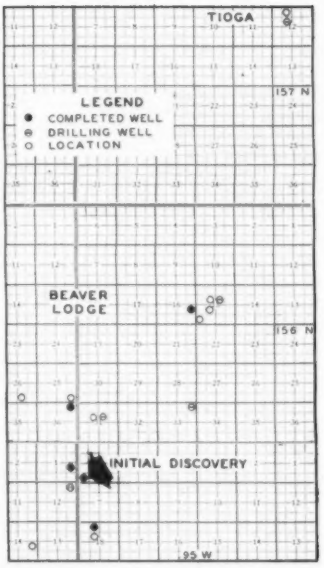
L. H. L. Hunt 1 Olsen, 18-163n-77w, a location.

M. H. L. Hunt 1 Wald, 23-155n-81w. Now shut down for orders at 7,150 ft. This tight hole apparently recovered only gas-cut mud on drill-stem test.

N. H. L. Hunt Oil Co. 1 Peter Lanertz, 17-153-77w, has surface casing set.

O. Stanolind Oil & Gas Co. 1 Long Lake, 28-150n-80w, drilling below 5,900 ft. No oil has been recovered on drill-stem test.

Beaver Lodge area.—The detailed map shows the activity in the area of the initial Williston basin discovery well (actually T157n-R59w is offset 3 miles to the west).



BEAVER LODGE.—Drilling status in area surrounding Williston discovery well. Position of region in relation to other basin activity is shown in preceding map.

In the Tioga area, Amerada 1 Bakken (SW NW 12-157n-95w) is at a total depth of 13,709 ft. with casing set at 13,066 ft. This wildcat was the first in the basin to flow oil from the Mississippian-Madison. It also had shows on tests of the Devonian rocks and was carried down to take a look at the top of the Ordovician.

Though Tioga is not officially an oil field, the 1 Bakken indicated such substantial production on tests of the Madison that the field is virtually assured. Amerada has located 1 Ludvic Bakken, a development well immediately to the north of the 1 Bakken.

Southwest of this indicated discovery area in SW SE 30-157n-95w, is Tioga Petroleum-American Viking et al. 1 Nelson, a location.

Down in Beaver Lodge field there are five completed wells, four drilling wells, and eight locations.

Completions.—Amerada 1 North Dakota "A" (NE SE 16-156n-95w); Amerada 1 Knutzen (NE NE 36-156n-96w); Amerada 1 M. Iverson (NE SE 1-155n-96w); Amerada 1 C. Iverson (the initial discovery), and Rudman-Tioga-American Viking 1 M. Iverson (NE NW 18-155n-95w), which has recently been completed in the Devonian at 11,740-70 ft. All of Amerada's producers are in the Madison.

Drilling wells.—Amerada 1 Dilland (SW NE 31-156n-95w) is fishing at 13,325 ft. Drill-stem tests at 8,400-8,500 ft. flowed 40°-gravity oil at rates up to 50 bbl. hourly; Amerada 1 Almer Iverson (NE NE 12-155n-96w) is below 700 ft. Amerada 1 C. Nylander (SW NE 15-156n-95w) is running casing after penetrating the Madison to 8,596 ft. Amerada 1 Obergaard (NE NE 33-156n-95w) is drilling below 8,900 ft. with no oil recovered to date.

Locations.—H. L. Hunt 1 M. Nylander (SW NW 15-156n-95w). H. L. Hunt 2 Nylander (NE SW 15-156n-95w). Amerada 1 Heen (SW SW 15-156n-95w). Amerada 1 Herfindahl (SW SE 26-156n-96w). Hunt 1 Rye (SE NW 31-156n-95w). Amerada 1 Alvin Iverson (NE SE 14-155n-96w). Rudman-American Viking et al. 1-B Math Iverson (SE NW 18-155n-95w). Amerada 1 Fretland (SE SE 25-156n-96w).

(A biographical sketch of Alfred Jacobsen, president of Amerada, which made the first Williston strike, appears in this issue on page 95).

Industry Briefs

WASHINGTON.—Morris T. Carpenter, of Chicago, administrative director of the research department of Standard Oil Co. (Ind.), has been appointed assistant director of the refining division of the Petroleum Administration for Defense. He succeeds Walter C. Huffman, who is returning to Sun Oil Co. after 18 months of service with PAD.

LONG BEACH, Calif.—Union Oil Co. has broken ground for its new $679,000 ammonium sulfate and $416,000 sulfur-recovery plants at its large Wilmington refinery near here. The Defense Production Administration cleared the way for their construction recently by approving accelerated tax amortization on 70 per cent of the cost of both projects.

CASPER, Wyo.—The Wyoming Geological Association will hold its seventh annual field conference August 1-3 with Thermopolis, Wyo., as headquarters. Daily field trips will be conducted in the southeastern portion of the Big Horn basin of Wyoming.

OKLAHOMA CITY.—"Summary of Water-Flooding Operations in Illinois to 1951," a report summarizing data on 63 controlled floods, is now being distributed by the Interstate Oil Compact Commission. Copies may be obtained upon request from the commission, Box 3127, Oklahoma City 5.

LONG BEACH, Calif.—Continuing its program of placing markers on old producers which have contributed much to California's oil history, the Petroleum Production Pioneers on May 3 will place a plaque on Shell Oil Co.'s 1 Alamitos, discovery well of the Signal Hill oil field. Completed in June 1921, the well touched off one of the state's greatest drilling eras.

Brief for Unitization

It recovers more oil at lower cost, North Texas group is told; water floods justify use of best men, Buckles says

Roy F. Carlson

WICHITA FALLS, Tex. — Unitization provides higher ultimate oil recovery and reduced operating costs, as proved amply by case histories, and has become an effective tool in the drive toward greater conservation.

It provides a common ground where all operators can meet to control a field's depletion better than they could if operating independently, Lawrence E. Brock, unitization superintendent of Stanolind Oil & Gas Co., told members of the North Texas Oil and Gas Association meeting here.

Unitization represents, he said, the nearest approach to the Utopia of oildom — the maximum economical recovery of petroleum hydrocarbons. The higher ultimate recovery results from adoption of an engineering program best suited to the particular reservoir involved, he said.

Brock presented these advantages of unitization:

. . . **Flare gas** can be utilized in many ways to the advantage of all operators.

. . . **Operating and development costs** and materials inventories of the development campaign can be reduced.

. . . **Common pooling of knowledge** makes a great deal of information available at low cost.

. . . **The tax burden** can be lightened somewhat.

While secondard-recovery methods are possible in a field on an individual basis, Brock said, there are two reasons why they are not as effective as unitized projects.

For one thing, migration of oil in a unit can be encouraged to those wells selected for producing oil, while under individual lease operations, migration must be discouraged to prevent escape of oil to an adjoining competitor's lease. Secondly, operational efficiency under a unit program is increased because all development plans are laid on a field-wide basis, and the best-suited producing mechanism can be used as a matter of course.

Personnel important.—G. L. Buckles, Monahans, Tex., consultant, emphasized that use of the best personnel available was essential in operation of a water flood.

Since water flooding will often produce as much oil as primary production at a much lower cost, Buckles said, management should pick the best man possible to conduct the program.

Control of a flooding program, he said, should be centralized in the field under one man, with all personnel involved in the flood, from pumpers to purchasing agents, under his control. This man should be given the proper authority and then let alone, Buckles declared.

Jet bits discussed.—Although they are new, enough experience is now available to show that jet rock bits perform better than conventional bits, L. S. Payne, chief engineer of Hughes Tool Co., said.

However, he added, in evaluating them for a particular job the operator must remember that jet bits cost more, and their use might increase the cost of operating hydraulic equipment.

When using jet bits, Payne said, sufficient jet velocities must be obtained to lift cuttings from the bottom rapidly and to cause enough turbulence around the bit to clean the cutters thoroughly. Circulation rates that create a fluid velocity of 180 ft. per second in the annulus are considered sufficient for most conditions, he said.

Only new factors introduced by jet bits so far as the use of hydraulic equipment is concerned, are an increase in pump-discharge pressure and a corresponding increase in horsepower input to the pump. It is advisable, Payne said, to anticipate the depth of a hole at which pumps or engines may be loaded to rated capacity in order to avoid hazards of insufficient circulation or overloading of pumps and engines.

Public Should Know Oil

Showing how the industry operates and what it does will solve oil's problems, frustrate attackers, N.T.O.G.A. told

WICHITA FALLS, Tex. — The best defense against current attacks on the oil industry is to tell the public more about the industry and how it operates.

Speakers at the twenty-second annual meeting of the North Texas Oil and Gas Association here said the principal problems facing the industry are these:

Countering charges that the oil companies are growing fat at the expense of other taxpayers because of the depletion-allowance "loophole."

Refuting the misguided argument that integrated oil companies should be broken up because bigness is evil in itself.

Prodding the Government into action on the stalemated tidelands issue.

Securing relief from inflexible price ceilings which are squeezing the industry more and more as costs and taxes continue to climb.

Adoption of a better public-relations program and enlistment of public support was cited as a weapon to accomplish all these ends.

"Bigness" stigma.—James H. Doolittle, vice president of Shell Oil Co., said one of the first things to overcome is the false stigma of bigness—that bigness is evil in itself. People should know, Doolittle said, that the industry can send 3 gal. of product weighing 350 oz. from Houston to New York for what it costs to mail a 1-oz. letter, and that if the industry were not big and integrated the price of gasoline would rise an estimated 3½ cents per gallon.

The public must be familiarized with all parts of the industry and shown that integration is the key to its efficiency and performance.

Controls hit.—One of the vehicles for carrying the information on the industry to the pubic—the Oil Industry Information Committee of the American Petroleum Institute — was described by Don Agnew, district representative for the OIIC.

The big job now, Agnew said, is to point up the dangers of the current socialistic trend, the trend of more and more controls on the oil industry, and to explain to the public why these controls are wrong. The production branch of the industry should begin to assume a larger share of the load of spreading this information, he said.

The current chairman of the Texas Railroad Commission, Olin Culberson, also took issue with government planners and interference. There is ample evidence, he said, that our productive might is being hamstrung rather than stimulated by our so-called mobilization controls. It is time to back off, he said, and see whether it promotes or retards progress in mobilizing.

Costs to the oil man are up, he said, while oil is fixed by a special inflexible price control, and oil men are told to expand production. Simultaneously supplies of materials are

AT N.T.O.G.A. MEETING.—Principal speaker at the twenty-second annual banquet of the North Texas Oil and Gas Association was James H. Doolittle, left, vice president of Shell Oil Co. and famous flier. With him are Lt. Gen. Ernest O. Thompson, Texas Railroad Commission; M. C. McCullough, N.T.O.G.A. president; Maj. Gen. Caleb V. Haynes, Sheppard Air Force Base commanding general; and C. P. McGaha, Wichita Falls independent oil man.

restricted by the Petroleum Administration for Defense. These fixed prices and shortages of oil-field material may cause an oil shortage to become a reality in the future.

R. L. Foree, new head of the production division for PAD, answered Culberson, saying that the shortage is not now in supply of ingot or sheet steel, but rather in tube-mill capacity. This mill capacity, Foree said, should be improved a little by the end of 1952, improved a great deal during 1953, and almost gone early in 1954.

Taxes too heavy.—The other two members of the Texas Railroad Commission, Lt. Gen. Ernest O. Thompson and William J. Murray, also pointed out the dangers of excessive taxation.

Thompson said that the United States will require 12,000,000 to 14,000,000 bbl. of oil daily by 1975. The nation can meet this demand and any military demand in the event of World War III if the federal Government retains the depletion allowance, reduces taxes, and if a free competitive system is permitted in the oil industry.

In pointing out excessive taxes, Thompson said, "We are at the point of diminishing returns. High taxes dry up initiative. High taxes can wipe out jobs and entire business establishments. We must prepare for defense, of course, but we must not bankrupt the country."

Murray, too, said that a progressive tax burden eventually will reach the place where it stifles incentive. He also warned the oil men of a possible glut on the oil market by resumption of production in Iran, and resulting serious damage to the oil economy. The tax situation, the foreign oil, and a possible business recession should all be considered now in planning any kind of production and conservation programs, he said.

Higher price.—Harold B. Fell, vice president of the Independent Petroleum Association of America, from Ardmore, Okla., beat the drum for higher crude-oil prices. Comparing costs of wells and prices received for crude oil, he suggested that crude prices for the remainder of 1952 should be at about $2.98 per barrel, and during 1953 should be at $3.28 per barrel.

He lashed out at controls on oil prices, suggesting that the only time that prices should be controlled is when the government is buying that product in such quantities as to create an artificial shortage. He suggested that if the government bought more than 10 per cent of a material, that prices might be controlled.

Sun Expanding

$110,000,000 budget set, largely for five projects

PHILADELPHIA. — Sun Oil Co. plans to spend $110,000,000 this year in an accelerated expansion program topping by $30,000,000 its outlay in 1951.

This year's budget will go largely for five projects: Construction of a new refinery at Sarnia, Ont.; construction of extensive petrochemical facilities at the Marcus Hook refinery; construction of four 30,000-dwt. supertankers; the most extensive drilling program in the company's history; and expansion of capacity at the Toledo refinery.

Petrochem facilities.—Construction is now beginning on the $12,000,000 aromatics plant at Marcus Hook, which will combine Platforming and Arosorb to produce annually about 15,000,000 gal. of benzene, 22,000,000 gal. of toluene, and 19,000,000 gal. of xylenes.

Engineering and purchasing of materials are under way on a plant to separate and purify natural naphthenic acids from crude oil and to manufacture and purify sulfonates. Facilities are also under way for the synthesis of household detergents.

Completion of propylene polymerization units at both Marcus Hook and Toledo has provided new sources of high-octane blend stocks to aid in meeting the current TEL shortage, Sun said in its annual report. Now, work is under way on sizable additions to the gas-recovery plants at both refineries. This work will be completed by the end of 1952.

At Marcus Hook, the company built, largely from second-hand materials, a $1,000,000 refrigeration unit to control temperature in an alkylation unit.

Three other projects were under construction at Marcus Hook. A new plant to produce naphthenic lubricating oils is being added, and furfural-extraction capacity is being expanded 50 per cent. A vacuum-distillation tower is being built to increase asphalt production and provide additional charging stocks for catalytic cracking.

Sun reports that the Toledo refinery, recently expanded, realized a higher throughput capacity than previously anticipated. The air-lift system in the refinery's new Houdriflow unit was perfected to operate with less expensive clay catalyst at a catalyst-loss ratio considerably below original estimates.

Delay at Sarnia.—Completion of the new Sarnia refinery has been set back due to delays in obtaining materials. Construction will begin this spring, however, and the refinery is expected to be on stream by the early summer of 1953.

The plant will have a capacity of 10,000 to 15,000 bbl. per day. The program involves erection of a combination atmospheric and vacuum crude-distillation unit, a Houdriflow catalytic cracking unit and catalytic reforming facilities.

Research.—The company's research efforts, highlighted last year by the development of the Arosorb process, continue strong along the same petrochemical lines. Work is continuing to improve and perfect Arosorb.

Growing out of this are investigations into uses to be made of the large volumes of hydrogen resulting from catalytic reforming operations. Three processes for profitable utilization of hydrogen were reported by the end of 1951.

New work is continuing on the separation of xylenes from the Arosorb stream.

Strike Near Settlement

NEW YORK.—The strike which has halted operations at the 80,000-bbl.-daily refinery of Tide Water Asso-

ciated Oil Co. at Bayonne, N. J., since January 7 is approaching settlement.

Union members were voting on a new agreement which was reached after compromises on several controversial points.

The proposal was for a 3-year contract, which the company has insisted on all along to give long-range stability to its operations. Fringe benefits rather than wages have been the issue in the prolonged refinery strike.

The plant can be brought back into production in short order as soon as the workers return to their jobs. Since the walkout began some 200 supervisory employes have been keeping the plant in operating condition.

Approximately 1,800 employes have been involved in the strike. They are represented by their own independent employes association.

Metals in Petroleum

Trace metals in crude affect many operations; elemental sulfur blamed for much refinery corrosion in A.C.S. paper

Gerald L. Farrar

MILWAUKEE. — Metal - containing substances in petroleum affect the flow of water and oil in reservoirs, complicate analyses of core samples, cause catalyst poisoning and equipment corrosion in refining processes, and destroy refractory brickwork during combustion of hydrocarbon fuels.

Speakers pointed out these facts at the American Chemical Society national meeting here last week, in sessions of the division of petroleum chemistry.

Production altered.—Metals in crude oil probably were originally absorbed from connate water in contact with the oil in the formation, said C. G. Dodd, Petroleum Experiment Station, U. S. Bureau of Mines, Bartlesville, Okla.

Dodd presented a paper authored jointly with J. W. Moore, fellow staff member, and M. O. Denekas, University of Tulsa, Tulsa, Okla.

Metal-containing materials in crude oil change the wetting pattern of oil-water mixtures, thus affecting reservoir flow. The nature of these changes is related to the variation in metal content of the crude, and is yet to be determined, Dodd said.

The authors pointed out that the metal-containing substances are film-forming and surface-active agents, and that most of the effects of the agents can be traced to these properties.

Analyses of core samples are complicated by the emulsifying properties of the agents and by interference due to the presence of the metals, Dodd said. He also stated that formation of some stock-tank emulsions could be traced to these compounds.

Of the metals present in these surface-active agents, zinc, copper, nickel, titanium, calcium, and magesium are especially active. Iron and vanadium are active to lesser degrees, the authors concluded.

Metal Volatilization.—"Presence of metals in vacuum distillates is caused by actual volatilization of soluble metal compounds in the crude oil," R. A. Woodle of the Texas Co., Port Arthur, Tex., told the chemists. Co-author of his paper was W. B. Chandler, Jr., of the same organization.

The authors thus ruled out the idea that presence of metals in petroleum distillates is caused by entrainment in processing vessels.

Certain metals poison cracking catalysts and should be removed prior to the cracking step, Woodle pointed out. Removal of these metals must be accomplished by some means other than distillation.

While metallic compounds of varying molecular weights may exist in the crude, only those of relatively low molecular weight contribute to the metal content of vacuum distillates, Woodle said.

Refractory damage.—Minute quantities of metals in petroleum fuels are highly destructive of refractory brickwork during combustion, R. L. Hardy said in a paper authored with M. C. K. Jones. Both men are employed by the Esso Laboratories of the Standard Oil Development Co., Linden, N. J.

On burning, the metals are converted into metal ash, explained Hardy. These materials lower the fusion point of the brick, thus causing melting. Cracking of the brick also results, due to uneven thermal expansion, he continued.

Vanadium in the presence of sodium constitutes a particularly harmful combination. Since these two metals are found in most crudes, the problem is widespread from a supply standpoint, Hardy said.

The damage to brickwork can be reduced by proper furnace design to minimize flame impingement and by the selection of resistant refractories, such as high-alumina brick and magnesia brick, he continued.

Fuels having comparatively high metal contents cannot be used in operating gas turbines. Ash deposits on the blades cannot be tolerated for corrosion and balancing reasons, he said.

Elemental sulfur.—A number of crudes contain elemental sulfur which leads to high-temperature hydrogen sulfide corrosion, according to B. H. Eccleston and colleagues of the Petroleum Experiment Station, U. S. Bureau of Mines, Bartlesville, Okla.

These conclusions were presented in a paper by Eccleston, Marilyn Morrison, and H. M. Smith. Elemental sulfur may also be produced from hydrogen sulfide if contacting the crude with air is not avoided, the authors continued.

Elemental sulfur leads to increased corrosion in refinery equipment, said Eccleston. Chemical reactions occur at 300° to 500° F. to produce hydrogen sulfide from hydrocarbons and the elemental sulfur, he continued.

Hydrogen sulfide in the crude feed to refinery processing units is vaporized and removed at low temperatures, while hydrogen sulfide produced from elemental sulfur contacts refining equipment at comparatively high temperatures. This results in accelerated corrosion, he explained.

Some West Texas crudes contain substantial amounts of elemental sulfur. Among these are Fuhrman Mascho, with 1.31 per cent; Goldsmith, with 0.70 per cent; McElroy, with 0.52 per cent; and Sand Hills (McKnight), with 0.47 per cent, Eccleston concluded.

Acid From Naphtha

Higher prices for cresylic make recovery profitable

MILWAUKEE. — Cresylic acid of good quality may be recovered in substantial quantities from catalytic naphthas, said S. G. Gallo in an address at the national meeting of the American Chemical Society here last week.

Speaking before the division of petroleum chemistry, Gallo presented a paper coauthored with C. S. Carlson and F. A. Biribauer. All three men are associated with the Esso Laboratories, Standard Oil Development Co., Linden, N. J.

Increased demands for cresylic acid make this recovery commercially attractive, the authors pointed out. As much as 80 per cent or more of the cresylic acid present in the naphtha may easily be recovered by treatment with dilute caustic soda solution, they continued.

Catalytic naphthas contain about 10 times as much cresylic acid as do thermal naphthas, Gallo said. An assay of seven stocks showed as much as 0.37 volume per cent of this material. The heavy naphthas are richest in cresylic acid content, he added.

Acidification of "spent" caustic soda solution after absorption of the cresylic acid is necessary for product recovery. This may be accomplished either by flue gas or spent sulfuric acid, according to Gallo. He warned that the naphtha should not be acid-treated prior to the caustic

PETROLEUM DIVISION OFFICERS.—Snapped at the annual meeting of the American Chemical Society were, left to right, F. E. Frey, assistant director of research of Phillips Petroleum Co., retiring chairman of the division of petroleum chemistry; A. L. Lyman, director of laboratories of Cal-Research Corp., chairman-elect; W. D. Seyfried, Humble Oil & Refining Co., who presided over the nonhydrocarbon symposium; and A. G. Oblad, Houdry Process Corp., new secretary-treasurer of the division.

soda treatment, since as much as two-thirds of the desired product may be destroyed by this procedure.

Sweetening.—The only serious contaminants in the cresylic acid are the thiophenols, the authors stated, adding that these may be removed by air-blowing, distillation, or limited neutralization to produce "sweet smelling" product.

Creslyic acid is the commercial name for mixtures of phenolic materials. The product recovered from naphtha consists substantially of cresols, xylenols, and phenol, in increasing order of abundance, Gallo said.

Cresylic acid obtained from naphtha is equivalent in fundamental properties to the material obtained from coal tar, the authors concluded.

High Aromatics Yields

Houdriforming of stocks high in methylcyclopentane and cyclohexane gives good results, A.C.S. oil division told

MILWAUKEE.—High yields of aromatics may be obtained by Houdriforming stocks rich in cyclohexane and methylcyclopentane, said Heinz Heinemann of Houdry Process Corp., Linwood, Pa. Heinemann addressed the petroleum division of the American Chemical Society here last week at the annual meeting of the society.

G. A. Mills, J. B. Hattman, and F. W. Kirsch, all of Houdry, joined with Heinemann in preparing the paper for presentation.

Substantial yields of aromatics may also be obtained by processing normal paraffin hydrocarbons, Heinemann continued. The authors had conducted investigations using pure hydrocarbons as feed stocks for evaluation purposes.

Cyclohexane conversion. — At conditions of 950° F., 300 psig., liquid space velocity of three volumes of feed stock per catalyst volume per hour, and a hydrogen to hydrocarbon mol ratio of four to one, cyclohexane is substantially 100 per cent converted to products, the authors revealed.

Of the total feed, 82.4 volume per cent was recovered as pentanes-plus fraction. Of this fraction, 91.50 volume per cent consisted of benzene, 1.30 per cent was methylcyclopentane, and 6.90 per cent consisted of paraffin hydrocarbons, predominately "iso" compounds, Heinemann continued.

Methylcyclopentane conversion. — At conditions of 975° F., a liquid space velocity of six, and other conditions as for cyclohexane, 79.6 per cent of methylcyclopentane is converted, he said.

Forty per cent of the feed is converted to an aromatic fraction which is substantially 100 per cent benzene, added Heinemann.

n-Heptane conversion.—With the same conditions used for methylcyclopentane conversion, approximately 18 volume per cent of a n-heptane charge (fed in the presence of benzene) is converted to aromatics, he continued. This fraction consists of a variety of products, he concluded.

Gasoline from L.P.G. — Substantial yields of gasoline may be obtained by cracking propane and butane at high pressures and temperatures, said H. J. Hepp and F. E. Frey of the research division of Phillips Petroleum Co., Bartlesville, Okla.

The ultimate yield of gasoline boiling-range products in recycle operation is approximately 38 per cent by weight for propane and 48 per cent for the butanes, the authors stated.

Pressures of 1,500 to 2,500 psig. and temperatures of 977° to 1,112° F. were used in the investigations. Cracking velocities of propane and the butanes are substantially higher at these high pressures than at atmospheric pressure, the authors said.

Dow Plans Research Center

FREEPORT, Tex.—Dow Chemical Co. last week received bids on its new $2,500,000 research center to be built near Plant B, Velasco.

The eight-building project is to provide extensive research facilities for the company and will have a floor space of approximately 57,000 sq. ft.

New Council to Study Oil

TROY, N. Y.—The petroleum industry and its impact on world economy will be the subject of the first assembly May 16-17 of the Industrial Council, recently formed at Rensselaer Polytechnic Institute.

Three themes of the meeting will be the development of the industry, its financial background, and its contribution to society. Specific problems scheduled for discussion are spiraling taxation, labor relations, and the development of new markets and supply sources.

Speakers will include Joseph E. Pogue, Chase National Bank petroleum consultant; Sidney A. Swensrud, president of Gulf Oil Corp.; and Leonard F. McCollum, president of Continental Oil Co.

Sun Reaches Scrap Goal

PHILADELPHIA.—Sun Oil Co. last week announced it has reached its 6-month scrap-collection goal of 8,000 tons.

The drive isn't ended, however. Paul D. Barton, chief engineer of the company's manufacturing department, who headed the drive, said the company already has decided to scrap several more existing installations "in the light of our experience in the drive just closed."

Sun began the pilot collection campaign at the request of the American Iron & Steel Institute, which wanted the program as a measure of what oil companies might be able to do in an all-out, scrap-collection program. Most of Sun's scrap, Barton said, came from obsolete buildings and process units, outworn storage facilities, and heavy equipment that was still in partial operation, rather than from usual scrap sources.

Crude Increase Seen

Thompson says new OPS leader will take more realistic view of needs, thinks 40-cent price boost fairly certain

Henry D. Ralph

NORMAN, Okla.—An increase in the price of crude oil in the near future was predicted by Commissioner Ernest O. Thompson of the Texas Railroad Commission while addressing the Oil and Gas Conservation Institute here April 2.

"You can almost feel a crude price rise of about 40 cents a barrel in the air right now," he declared.

As reasons for this feeling, Thompson cited the growing recognition that the oil industry cannot develop the reserve producing capacity and carry out the huge expansion program requested by the defense authorities while prices are pegged on the basis of old low costs.

He predicted that Ellis Arnall, the new director of the Office of Price Stabilization, will take a more realistic view than his predecessor and that pending petitions of Pennsylvania and California producers for higher prices will lead to a general increase in the ceiling prices of crude and products throughout the country.

Thompson's remarks on prices were interjected into a speech on the history of conservation in Texas, during which he stressed the need for financial incentives to make conservation programs effective.

The Conservation Institute, held under the auspices of the University of Oklahoma, drew more than 300 oil men for a discussion of technical and legal problems of better utilization and recovery of oil and gas in the earth.

Both Dean W. H. Carson of the School of Engineering, and Earl Foster, executive secretary of the Interstate Oil Compact Commission, expressed the hope that the institute would become an annual affair for the discussion of technical means of promoting conservation and guiding oil companies and regulatory bodies in this program.

More progress has been made in conservation during the last 15 years than in all the rest of the industry's history, it was declared by Foster, who outlined the history of state cooperation in regulating oil production to prevent waste.

Wide spacing advocated.—This statement was amplified by Dr. Herman H. Kaveler of Phillips Petroleum Co. who declared that the most important discovery about petroleum since the Drake well was the recent realization that oil does not produce itself but can be recovered from the earth only by utilizing the pressure of gas and water in the reservoir.

Reviewing the history of legal concepts of oil recovery and ownership through the rule of capture and flat per well proration, Kaveler asserted that surface owners must divide the oil among them in some way and that the most equitable way and the way which will bring greatest recovery for all is to divide it before it is produced, Kaveler made a strong plea for compulsory unitization of a field before production begins in order to get the best utilization of gas and water pressures.

Advocating wide well spacing, Kaveler made the statement, which was challenged by some of his listeners, that a single well could completely drain any oil field, given sufficient time and proper employment of gas pressure and water drive.

Legal aspects of conservation were discussed by H. Murray Robinson, Oklahoma City attorney, and R. M. Williams of Phillips Petroleum Co., who explained that engineering theories for conservation and maximum recovery cannot always be put into practice immediately because the regulatory bodies must first have adequate laws from the state legislatures and then must succeed in having their orders upheld by the courts.

CANADA

Exports Approved

Alberta board recommends o.k. on gas-company plans

EDMONTON.—The Alberta Conservation Board has recommended that Westcoast Transmission Co., Ltd., be permitted to pipe natural gas from northern Alberta's Peace River region to the Pacific Coast of the United States.

The board rejected five other applications for export permits.

While the recommendation was significant, the provincial government is not bound to follow it. In presenting the report to the legislature, Premier E. C. Manning gave no indication of the government's attitude but said the house would have an opportunity to debate the report during the session expected to end April 10.

The board's report, published after more than 2 years of study, said the only surplus of gas at present is 300,000,000,000 cu. ft. in the Peace River area. No other gas, it said, is available above requirements of the province.

Westcoast Transmission plans construction of a gas line from just east of the Alberta-British Columbia border through British Columbia into the United States. A spur is planned to deliver gas to Vancouver.

In Washington, the Federal Power Commission announced it had postponed to June 16 a hearing scheduled for April 8 on applications involving importation of natural gas from Canada to serve the Pacific Northwest.

Looping Contract Let

EDMONTON.—Contract for a looping program which will add 18,250 bbl. daily to the capacity of Interprovincial Pipe Line Co.'s system between Regina, Sask., and Gretna, Man., has been awarded to Anderson International Contractors, Ltd., of Edmonton.

The contract calls for laying 100 miles of 16-in. pipe in two segments along the existing 334-mile, 16-in. line. R. E. Trammell, Interprovincial general manager, said the looping program will increase the system's capacity from the present 101,750 to 120,000 bbl. per day.

Work is scheduled to begin June 1, if ground conditions permit.

Froomfield Plant Progresses

SARNIA, Ont.—First units of the new refinery of Canadian Oil Companies, Ltd., at Froomfield, near Sarnia, are scheduled to begin initial operations in April.

As originally designed the refinery would have a capacity of 20,000 bbl. per day and would cost $22,000,000. Extra facilities, however, are now under construction which will increase the capacity.

The refinery's catalytic cracking unit, now building, will be the first of its kind in Ontario, although a similar unit is included in expansion plans of Imperial Oil, Ltd., at Sarnia and another is planned for the proposed refinery of Sun Oil Co. here.

Development Rights Sought

EDMONTON, Alta.—Three more applications for development rights in the northeastern Alberta Athabasca oil-sands area have been made to the Alberta government, involving 150,000 acres. The latest applicants are Socony Vacuum Oil Co., Inc., Sun Oil Co., and Edward Gilbert, manager of Sun's Calgary land department.

One week previously Alberta Mines and Minerals Minister N. E. Tanner announced that five independent Canadian oil firms had acquired a total of 250,000 acres of lease land in the northern oil-sands area and that a Swedish oil company had applied to lease part of the government-owned experimental plant at Bitumont. *(The Oil and Gas Journal, March 24, 1952, page 85).*

AT REFINING MEETING.—Participants in the first technical session of the W.P.R.A. meeting in San Antonio are, left to right, Earl Bartholomew, Ethyl Corp., Detroit; J. P. Hayworth, Standard Oil Development Co., Linden, N. J.; W. F. Krause, Globe Oil & Refining Co., Lemont, Ill.; C. W. Berger, Berry Asphalt Co., Magnolia, Ark.; R. C. Alden, Phillips Petroleum Co., Bartlesville; and V. A. Kalichevsky, Magnolia Petroleum Co., Beaumont. Berger presided, and Alden's paper on motor-fuel volatility was followed by prepared discussions by the four other members of the panel.

Trends in Refining

Leveling demand will require cut in runs, refiners at W.P.R.A. meeting told; higher octane ratings seen by all

George Weber

SAN ANTONIO.—Refining economics, trends in volatility, catalysts, increasing demand, and related subjects occupied attention of refiners attending the fortieth annual meeting of the Western Petroleum Refiners Association here last week.

The concensus of refining men present was that the octane rating of gasoline will show a considerable increase this summer, with regular climbing one to two numbers and premium gasoline showing an increase of about one number.

This reversal of the quality trend, permitted principally but not entirely by the slackening of restrictions on tetraethyl lead, will tend to make up all of the ground lost during the past year of lead allocations. In fact, some refineries were reported to be planning new high octane ratings for the approaching heavy-motoring season.

Lower runs seen.—Product demand, which has aggregated 8 to 10 per cent above 1951 volumes so far this year, is expected to average out at about 6 per cent over 1951 for the entire year, R. L. Tollett, association president, told the refiners.

This situation, he said, calls for further reductions in crude runs to stills, even though such operations have shown some leveling off recently. Curtailment in output of lube oils as well as fuels is indicated by the softening market, he said.

Because of the soft market and the prospect of reducing runs, refiners at the meeting were inclined to discount the possibility of any price increase for crude oil in the near future.

Coking economics.—Petroleum coking as a means of increasing light distillate yields at the expense of residual production will assume a much more prominent spot in the refinery of the future. This conclusion was reached in a paper prepared by R. T. Colquette and Carl W. Peters of Pan-Am Southern Corp., New Orleans.

In their company's appraisal of methods for disposing of crude bottoms, they viewed coking not so much as a method of reducing fuel-oil production but as a means of producing additional light products from a given quantity of crude.

Since its major demand is for gasoline and distillate fuels and its supply of crude oil is limited, they have chosen the coking route, which provides maximum ultimate yields of light products.

The authors developed the economics of increasing gasoline production by alternates: (1) Conversion of No. 6 fuel via coking and cracking, and (2) refining additional crude via topping and cracking.

The major difference in investment is the difference in cost of a coking unit and a topping unit, the coker being higher. With current Group 3 prices for fuel oil, the net savings for coking, however, indicate a very quick payout of the difference.

When viewed from this basis, the items of importance are the difference in price between crude oil and fuel oil. With such a differential of 60 cents or greater, coking is particularly attractive as a means of increasing gasoline production. With smaller differentials, the payout can be definitely marginal.

The authors noted that the coking of high-sulfur crudes imposed a heavier load on gasoline-treating facilities, since sulfur which is usually concentrated in crude bottoms will appear proportionally high in coke-still naphtha. No attempt was made to generalize on the advantages of coking, since the authors granted that peculiar price situations, product demand, equipment availability or the universal problem of capital funds greatly affect each specific situation.

Importance of catalysts.—The belief that the economic success of any catalytic reforming process will be determined primarily by the catalyst employed was expressed in a paper by M. J. Fowle, R. D. Bent, B. E. Milner and G. P. Masologites, of Atlantic Refining Co., Philadelphia.

The authors reported on catalyst performance from pilot-plant runs employing the Atlantic catalytic reforming process. Their selective platinum catalyst maximizes dehydrogenation of naphthenes and isomerization of paraffins and napththenes while controlling the undesirable cracking reactions.

Yields of methane plus ethane are consistently below 1 weight per cent, and the purity of the recycle stream runs approximately 95 mol. per cent hydrogen on pilot-plant runs. Liquid recovery of propane and heavier for a wide range of feed stocks and reforming severities runs from 96.8 to 101.7 volume per cent of fresh feed.

For high-sulfur feed stocks, a conventional hydrogen sulfide extraction using amines may be used to remove sulfur from the recycle gas. This is possible since the catalyst is not susceptible to deactivation by water. Experimental tests with extreme amine carryover showed some temporary decline in catalyst activity.

The authors reported that commercial units of this process ranging in feed capacity from 750 to 12,000 bbl. per day are in construction. Invest-

ment costs range from $350 to $450 per barrel of naphtha charge.

Houdriforming. — The place of the Houdriforming catalytic reforming process in refinery operations, was described by T. A. Burtis and H. D. Noll, of Houdry Process Corp., Philadelphia. Economic comparisons were made for seven separate cases employing Houdriforming in varying severities and on a wide range of naphtha feed stocks.

The authors concluded that Houdriforming is a worthwhile processing tool for: (1) Upgrading low-octane naphtha for incorporation in motor fuels; (2) practically complete desulfurization and octane improvement of high-sulfur stocks; and (3) processing of selected cuts for aromatics and/or gasoline blending stocks.

Officers elected.—Last year's slate of association officers was reelected to serve another term.

R. L. Tollett, president of Cosden Petroleum Corp., continues as president, and H. J. Kennedy, Continental Oil Co.; F. L. Martin, Sunray Oil Corp.; Roland V. Rodman, Anderson-Prichard Oil Corp.; and J. W. Vaiden, Skelly Oil Co., will continue in office as vice presidents.

Newly elected directors include: Bruce K. Brown, who will return to New Orleans as Pan-Am Southern Corp. president shortly upon his resignation as PAD deputy administrator; Max M. Fisher, vice president of Aurora Gasoline Co., Detroit; F. W. McCurry, vice president of Derby Oil Co., Wichita; Everett F. Wells, vice president of Ashland Oil & Refining Co., Ashland; and G. G. Woodruff, vice president of Globe Oil & Refining Co., Chicago.

Brown L. Meece, formally vice president of Globe, was reelected to the board. He is now vice president of Sinclair Refining Co.

Volatility Study

Phillips experts describe new method of analyzing trends in gasoline volatility which provides wide range of data

George Weber

SAN ANTONIO.—A new approach to analyzing trends in gasoline volatility was presented here last week before the fortieth annual meeting of the Western Petroleum Refiners Association.

The comprehensive paper was prepared by R. C. Alden, H. J. Elder, and Elizabeth Aldrich, all of Phillips Petroleum Co., Bartlesville. Their studies were based on the annual Bureau of Mines national motor-gasoline surveys, which show by areas the arithmetical averages for several gasoline brands of the Reid vapor pressure and distillation temperatures for the 10, 30, 50, 70, and 90 per cent points.

The Phillips technique is to plot volatilities on charts whose ordinates are expressed as the 10 per cent point plus the 30 per cent point versus the 70 plus the 90 per cent points.

The work originated from studies of the relationship between volatility and vapor lock. Interesting and useful relationships can be established on such graphs for many aspects of motor fuel volatility, the authors said. It has been a simple matter to extend the use of this method of study to other performance features and to the effects of refinery processes and operations on gasoline volatility.

While the important 50 per cent point is eliminated in these studies, it was found that the sums of the other four points showed fairly consistent relationship with the 50 per cent temperatures, and represented a reasonable approximation of the average volatility of "normal" motor fuel.

Charts are revealing.—The extreme variability of gasoline on the market at any one time has decreased somewhat because of the recent tendency for premium gasoline to approximate regular gasoline in volatility, the authors said. "The least volatile extremes are still becoming more volatile but the most volatile extremes are becoming less volatile.

"By plotting 10 + 30 versus 70 + 90 distillation temperatures it is possible to show the trends, relationships to octane numbers, the effects of ingredients, raw materials, and refinery processes, and the resulting changes in engine performance on common ordinates.

"The war-hastened processes of catalytic cracking and alkylation result in less change in average volatility than other refinery processes, such as vapor recovery, catalytic polymerization, polyforming, thermal reforming, and catalytic reforming.

"The increased volatility of gasolines has resulted in a pronounced improvement in the potential performance of automobile engines, particularly in regard to acceleration factors. Obviously, the improvement in these important performance features is offset by a greater tendency for vapor locking and carburetor icing. The temperature for easy starting and for 95 per cent evaporation have been reduced," they continued.

"The changing characteristics of motor fuel and engines represent a constant challenge to make as certain as possible that full advantage is taken of progress in both the petroleum and automotive industries," concluded the authors.

Vapor lock and icing.—A discussion following presentation of this paper brought out some interesting points regarding certain such advantages, relating to the control of vapor lock and carburetor icing.

Automotive research groups were reported continually seeking new engine designs which will permit higher volatility. Success may mean the use of more light ends in gasoline without getting into summer vapor lock trouble.

The prevention of carburetor icing through use of 2 per cent isopropyl alcohol in gasoline was cited by one major refiner who has adopted the additive route. This permits using winter fuels with volatilities promoting easier starting and warmup.

A significant example of the attention automotive engineers are reported giving to the problem is the new Chrysler engine, which moderates carburetor temperatures with cooling water. This design, according to at least one oil company's road tests, has eliminated both vapor lock, by cooling the carburetor in summer, and icing, by warming the carburetor in winter.

In general, the use of higher-volatility motor fuels is believed definitely possible in the future, and the tone of the discussion indicated that such current problems as vapor lock and carburetor icing may well be relatively unknown 15 years from now.

Firm Reorganized

Hamiltons acquire control of Carl B. King Drilling

MIDLAND. Tex.—Reorganization of Carl B. King Drilling Co., Midland, Tex., as Carl B. King Drilling Co. of Texas has been effected with acquisition of a controlling stock interest in the company by Frederic C. and Ferris Hamilton, owners of Hamilton Drilling Co., Dallas.

B. R. SCHABARUM

The new organization is headed by Bruno R. Schabarum, general manager of the former company, who has been elected president, succeeding J. Ed Warren, recently called to Washington as deputy administrator of the Petroleum Administration for Defense.

C. J. Jensen, formerly drilling superintendent, has been made vice president, and H. Don Johnson, for-

merly accountant-office manager, secretary-treasurer. Directors are: Schabarum, Midland; Carl B. King, J. F. Hyman, and Frederic C. Hamilton, all of Dallas; and Dwight Williams, Oklahoma City. Jack Forgerson, formerly assistant drilling superintendent, has been made drilling superintendent.

Policies unchanged.—Headquarters of the new organization will remain at Midland, and general policies, activities, and personnel will remain unchanged.

Carl B. King Drilling Co. had its inception in 1906. Original operations were in Oklahoma. In the intervening years, it has operated extensively in many other states, including Illinois, Arkansas, Louisiana, Mississippi, Texas, and New Mexico. Since 1941, its activities have been mainly in the Permian basin region of the latter two states, where it currently is running 11 rotary power rigs.

Warren, retiring president, has been associated with the organization since 1934. Schabarum, who succeeds him, joined the company in 1944, coming from National Supply Co., where he was assistant to the president. He started with the drilling company as supervisor of engineering and equipment and became general manager in 1949.

Military Oil Views

Independents told armed forces favor increasing reserves, immediate tidelands development, and continued imports

FORT WORTH.—The military view toward many vital problems of the petroleum industry was outlined here last week by Brig. Gen. Alfred H. Johnson, chief of the Munitions Board's office of petroleum programs.

Addressing the Texas Independent Producers and Royalty Owners Association, General Johnson said the military favors:

Immediate development of the offshore oil land, a stepped-up exploratory program to increase this nation's reserve producing capacity, continuation of a reasonable balance between imports and exports, and a firm control by the free world over the foreign oil-producing areas which now supply the non-Communist nations.

The general, who also heads the joint petroleum committee of the Munitions Board, said the military "are strongly endorsing the industry's demands for oil-country tubular goods, line pipe, and other essential materials."

Need for reserves.—General Johnson told the independents the military would like to see our reserve production capacity "expanded to a point far greater than that which exists today."

"It is possible," he said, "that we may never have a 25 per cent reserve cushion to fall back on again, but it is a goal worth trying to attain from a military point of view."

"When considered in terms of possible war requirements," he added, "the reserve producing capacity is inadequate and should be increased through expanded exploration and drilling operations."

Declaring that "petroleum resources that are undeveloped provide no oil in time of war," the Air Force general said it is the view of the Department of Defense "that development of the tidelands should proceed as rapidly as possible and that all necessary action should be taken to permit rapid development of those areas" as of interest to national security.

Imports view.—Over-conservation of this nation's oil resources while importing at a high rate would mean a drastic drop in domestic production, Johnson said. On the other hand, attempted self-sufficiency in this country would mean depletion of our own resources.

"From the military viewpoint," he said, "it appears that a reasonable balance between exports and imports must be maintained for the Western Hemisphere as a whole in order to avoid any unnecessary drain on Western Hemisphere resources and serious dependency on non-Western Hemisphere sources in the event of war.

"Such a balance could be achieved without placing a penalty on U. S. producers," he added.

This nation must continue to maintain a close interest in foreign oil now available to the United States and its allies, the general suggested.

Imports Opposed

T.I.P.R.O. adopts eight resolutions at meeting

FORT WORTH. — Eight resolutions outlining the association's attitudes and aims were adopted here last week by the Texas Independent Producers and Royalty Owners Association.

The resolutions covered such subjects as tidelands legislation, gas prices, imports, taxes, and condemnation of land for underground storage. The association resolutions:

1. Advocated that the Texas Railroad Commission should have specific authority to set a minimum price for gas to prevent waste, that the association continue efforts to correct discrimination resulting from varying prices for gas in the same field not related to the quality of the gas or its distance from market.

2. Opposed Senate Bill 1000 which grants the federal Government power to condemn land for use in underground storage.

3. Favored legislation requiring public posting of field prices for natural gas.

4. Opposed any compulsory unitization.

5. Favored removal of ceiling prices from all commodities not in short supply.

6. Opposed enactment of any interim legislation concerning the tidelands, and asked for appointment of a committee to determine the best means by which the association might work to restore ownership of the areas to the states.

7. Opposed the supplanting of domestic production with foreign oil.

8. Asked that the association directors take action to eliminate undesirable aspects of existing state laws and policies governing ad valorem and personal-property taxes.

New officers.—Bryan W. Payne, Tyler, was elected 1952-53 president of the association.

Other new officers are Guy I. Warren, Corpus Christi, vice chairman; William T. Beard, Jr., San Angelo, treasurer; and L. A. Douglass, San Antonio, secretary.

Discovery to Be Completed

MIDLAND, Tex. — M. A. Grisham and associates will complete their 1 Grisham, which has established the first significant deep production in the Delaware basin, without further drilling.

Currently, the well is bottomed in an unidentified formation at 9,054 ft. with 7-in. casing cemented at 9,030 ft., thought to be the top of the pay. The operator plans to drill out the plug, run more tests, and complete.

The well, located on the extreme western edge of the basin about 30 miles northwest of Toyah in Culberson County, West Texas, blew in making an estimated 60,000,000 cu. ft. of gas daily *(The Oil and Gas Journal, March 31, 1952, page 59)*.

Opinions of geologists as to identity of the producing formation differ widely. Some think it is the Devonian, others the Mississippian, and still others maintain the gas is coming from a Pennsylvanian zone. So far no fluid has been produced with the gas.

Unconfirmed reports have it that a contract has been signed with El Paso Natural Gas Co. to provide an immediate outlet for the gas. El Paso has a large transmission line in operation about 25 miles north of the discovery.

Price Hike Favored

West Coast operators agree boost is necessary to obtain needed drilling; Elk Hills could solve supply problem

D. H. Stormont

LOS ANGELES.—West Coast major oil companies are saying little publicly about Union Oil Co.'s application for a crude-oil price increase averaging 60 cents per barrel.

Privately, however, company executives express the belief that such a price boost is necessary to encourage wildcatting and development required to provide the needed new reserves.

In view of the antitrust suit still pending against the top seven California oil companies, their reluctance to take a position on a price increase is not considered surprising. Small independent producers, however, have announced that they favor the increase.

Stocks dropping.—From the viewpoint of California's supply-demand situation, there is little question an added impetus is needed.

Total oil stocks in District 5 had declined to about 82,000,000 bbl. on March 1, down 14,520,000 bbl. in a year. During the past month they are estimated to have declined at the rate of about 30,000 bbl. daily. Already at near minimum working levels, outlook for the remainder of the year is one of continued decline.

Last year's drop was registered despite an increase in crude production of about 20,000 bbl. daily. With California fields producing at maximum efficient rates, with but few exceptions, the trend appears to be leveling off near the 980,000-bbl. daily mark. This is the level of the past 3 months in spite of the fact that new wells were being completed at a rate 15 per cent higher than that of the same period in 1951.

Union, which last year was a net purchaser to the extent of about 40,000 bbl. daily, estimated that total demand on the Pacific Coast will reach 1,200,000 bbl. daily by 1955 and 1,300,000 bbl. daily in 1960.

For the West Coast to remain self-sufficient, the company said in its application to the Office of Price Stabilization, about 1.5 billion barrels of new reserves must be found by 1955 and almost 4 billion by 1960.

To accomplish this, the application said, the annual discovery rate of the past 14 years would have to be exceeded by about 128,000,000 bbl. yearly *(The Oil and Gas Journal, March 31, 1952, page 69)*.

Elk Hills potential.—While OPS has not acted on Union's application, reports from Washington say the agency does not favor the request. The agency is expected to confer with PAD on whether a price increase would be necessary to provide additional oil for the mobilization program. Doubtful as to whether the price increase would provide much new production, OPS officials are suggesting opening of Elk Hills field as an alternate means of relief.

Should the Navy Department and Congress agree with this suggestion, which also was recommended earlier by PAD, the crude deficit would be remedied. The field is believed capable of adding about 92,000 bbl. to the state's daily output. Washington circles, however, regard it unlikely that Elk Hills will be opened in the near future.

Completion of 85 new Elk Hills wells in the past year, equally divided between the shallow and Stevens zones, has raised the potential from the shallow sand to 50,000 bbl. daily and that of the Stevens to about 42,000 bbl. With all producing facilities more or less ready, only a short time would be required for the field to start producing.

Currently four rigs are at work drilling the Stevens reservoir on an 80-acre well-spacing pattern, and two rigs are engaged in completing development of the shallow zone. In July it is planned to increase the number of Stevens rigs to seven and those for shallow-zone drilling to three.

CASTAIC HILLS SEARCH.—Along Highway 66 about 35 miles northwest of Los Angeles, these rotaries are searching for the 6,500-ft. Sterling sand in the Castaic Hills area. Two are drilling on properties of roadside businesses at closely-spaced locations.

Two Fields Joined

Completion of Texaco extensioner expected to link Honor Rancho and Castaic Hills fields in Santa Clara Valley

LOS ANGELES.—The Texas Co. apparently has linked its eight-well Honor Rancho oil field with the four-well Castaic Hills field to establish a northwest-southeast production trend over 2 miles in length in the upper Santa Clara Valley region of Los Angeles County.

At the first of the month the company was attempting to complete 10 Honor Rancho-2 as a link well about midway in the ¾-mile stretch which separates the two fields. Drilled to 6,540 ft. and with 7-in. casing set at 6,260 ft., the link test was expected to make a substantial producer from Castaic Hills' Sterling pay zone.

Only two locations removed from Honor Rancho, which to date has produced only from the shallower Rancho and Wayside sands, the extensioner is doubly important in that it indicates the deeper Sterling (Honor) sand may be productive there also.

None of Honor Rancho's producers

has been carried sufficiently deep to test the Sterling's presence. At a well on the south flank, however, an oil-saturated sand and conglomerate was found about 100 ft. below the base of the Wayside. Like the two shallower pays, 4,500 ft. and 5,500-ft. sands, it was wet, but it is believed to be the pay zone of Castaic Hills producers about 2 miles northwest.

Texaco has three rigs at work on its holdings on the large Wayside Honor Farm, a Los Angeles County farm for wayward boys. In the Castaic Hills portion, and largely along Highway 99 which separates the two areas, five more rigs are drilling for Continental Oil Co., Richfield Oil Corp., Douglas Oil Co., Federal Oil Co., and Dolley, Morton & Dolley.

Honor Rancho field, which produces from Delmontian and Mohnian rocks of upper Miocene age, is fairly well defined by dry holes and the San Gabriel fault which closes the eastern side of the anticline.

At Castaic Hills three dry holes have been drilled, one midway between two producers. It is anticipated, however, the trend will prove one of California's most important new-field discoveries since South Cuyama in 1948. *(For sketch map of the area and discussion of earlier developments, see The Oil and Gas Journal, January 28, page 189.)*

NATIONAL AFFAIRS

Quitclaim Bill Passed

Senate acts favorably on measure to return ownership of tidelands to states; Truman remains only obstacle to law

WASHINGTON.—Only the approval by President Truman stands in the way of the return of the tidelands to the states, as a result of adoption of quitclaim legislation by the Senate.

While the measure passed by the Senate April 2 differs in some respects from the bill passed by the House last year, there is no difference between the two chambers on the main issue of who is to have control of the submerged land.

Whether the House will accept the Senate version, thereby quickly sending the legislation to the White House, or will insist on its own measure, which would necessitate appointment of a conference committee to iron out the differences, was not immediately determined.

The Senate passed the legislation by a vote of 50 to 35 after throwing out by a vote of 50 to 34 the O'Mahoney resolution to provide for federal administration. The House passed its measure last year by a much wider margin.

The big questions now are whether President Truman, who has counted himself out for another term in the White House, will approve legislation which in the past he has vigorously opposed, and if he does not, whether Congress can pass it over his veto.

Sen. John C. O'Mahoney of Wyoming, chairman of the interior committee, predicted the Senate could not override a veto, but Sen. Spessard L. Holland of Florida, who spearheaded the drive for quitclaim, expressed confidence it would. A two-thirds vote in both chambers is required to override a veto, but there is little doubt the necessary vote could be secured in the House.

The Senate measure returns to the states all their former rights in the marginal sea out to their state boundaries, in the case of Texas 10½ miles, but reserves to the federal Government the first call on oil produced in the submerged lands in times of emergency.

The Senate bill, however, does not carry a provision in the House measure giving the states 37½ per cent of revenue from oil and gas operations on the Continental Shelf beyond their boundaries.

Strike Issue

Oil firms will not accept industry-wide bargaining

WASHINGTON.—Oil companies involved in labor controversies are unalterably opposed to any "one-package" hearing of the issues which might lead them into the trap of industry-wide bargaining in which the steel companies find themselves.

Company representatives attending a hearing before the Wage Stabilization Board April 2 to consider the procedure to be followed were assured by Chairman Nathan P. Feinsinger, however, that regardless of the setup arranged for the panels which will hear the disputes, the board will consider each case separately when the panels report.

While O. A. Knight, president of the Oil Workers International Union, told the board he had been authorized to represent both his own C.I.O., the independent unions involved in controversies and the A. F. of L., which has not yet been named in any case referred to the board, and was prepared to make a consolidated presentation.

Procedure opposed.—There was also opposition to the procedure outlined by Feinsinger to have the panels make purely factual reports. Company officials urged that they should be permitted to make recommendations, so the board would have something more than the "cold record" on which to base its decision.

The companies made it clear they feared the result of consolidating the disputes would result in industry-wide bargaining, but Feinsinger emphasized that the board does not intend to change the established pattern of bargaining and will protect it.

About 80 companies are involved in wage disputes so far referred to the board. A number of companies were not represented at the hearing, and a spokesman for one of the four natural-gas companies named urged that separate consideration be given their disputes because their conditions differed from those in the oil industry.

New NPA Directives Out

WASHINGTON.—The following orders have been issued by the National Production Authority:

Amendment 1 to M-46A, March 26: Providing a new definition of "large construction operations" in foreign oil operations.

Amendment to M-57, March 26: Removing the restrictions on the use of quebracho in oil-well drilling.

Amendment to M-92, March 26: Easing restrictions on auto wreckers to bring out more scrap.

Dir. 2 to M-46, March 31: Permitting the filing for new allotments of oil-country tubular goods by small operators unable to place their first-quarter orders.

Amendments to CMP Regs. 1 and 3, March 31: Amending the extension of ratings to "B" products for military, Atomic Energy Commission, and vital machine tool production.

All TEL Controls Suspended

WASHINGTON. — All restrictions on the use of tetraethyl lead by refiners are being eliminated, and octane values of motor gasoline are expected to rise to 1951 levels or close to them within a short time.

Elimination of the limitations imposed by PAD Order No. 1 in February 1951 was decided upon by the Petroleum Administration for Defense after reaching an agreement with the military services on the size of reserve required. The TEL situation has been easing steadily over the past few months and in February of this year refiners' allowable consumption was raised to 107 per cent of the 1951 authorized usage.

PAD officials said the stockpile situation is now satisfactory, raw mate-

rials for TEL are in adequate supply, and new production capacity will come into operation in the near future.

However, they said, the quantitative limitations are being suspended, not revoked, and the effect of this action will be watched and, if necessary for reserve requirements, they will be reinstated.

The record-keeping and other provisions of PAD Order No. 1 will be kept in effect until next February for statistical purposes.

Expansion Approved

DPA endorses 18-month program to satisfy expected 8.5 per cent increase in domestic demand by the end of 1953

WASHINGTON. — Proposals of the Petroleum Administration for Defense for expansion of the oil industry during the 18 months beginning July 1 have been approved by the Defense Production Administration.

DPA also raised the goal for additional refinery capacity 50,000 bbl. per day above the PAD target.

Purpose of the program is to meet expected increases in total United States demand of some 5 per cent this year over 1951 and 3.5 per cent in 1953 over 1952. It also will provide increases in reserve producing and refining capacity.

As formally established by the DPA the program calls for the following domestic expansions:

. . . **Drilling of 25,000 wells** in the last half of this year and 55,000 in 1953.

. . . **New refining capacity** of 250,000 bbl. daily during the last half of 1952 and 500,000 bbl. daily in 1953, bringing total refinery capacity to just under 8,000,000 bbl. daily as of the end of next year.

. . . **More natural-gas production** and processing capacity to make 43,000 bbl. per day more natural-gas liquids in the last half of 1952 and 88,000 bbl. daily in 1953 to reach a total of about 751,000 bbl. daily as of the end of 1953.

. . . **More oil pipe lines,** including product lines, of 19,700 miles to be constructed during the 18-month period to reach a total of about 185,000 miles as of the end of 1953.

. . . **More storage capacity** of 153,113,000 bbl. during the last half of 1952 and all of 1953, composed principally of 127,413,000 bbl. for pipeline and terminal storage and 24,000,000 bbl. for storage at refineries.

In announcing its approval of the program, DPA said its action does not constitute a commitment to furnish controlled materials as of any given quarter, and actual allotments will be conditioned by available supply and competing demands. However, PAD officials anticipate no difficulties in getting the program through.

An increase in steel allocations for the third quarter will enable the industry to make a start on its expansion early in August. While this will be a month lost from the projected start July 1, it is expected the time will be made up readily as the program swings into high gear.

Foreign program.—The DPA-approved program for foreign development calls for the drilling of more than 10,000 wells and refinery-capacity increases of 576,000 bbl. per day during the 18-month period.

However, actual expansion, it was said, will depend on developments during the next 3 months, changes in company policies, and world conditions.

About 3,376 of the total number of 10,128 wells are charted for drilling during the last half of this year and 6,752 in 1953. Construction of 207,000 bbl. daily in new refinery capacity is called for this year and 369,000 bbl. daily next year.

The program calls for the laying of 1,520 miles of pipe line in 1952 and 2,280 miles in 1953; for construction of new storage capacity of 12,740,000 bbl. this year and 22,620,000 in 1953.

By the end of 1953, if planned construction is carried through, foreign refining capacity will reach a total of slightly more than 5,000,000 bbl. daily, which, with the United States expansion, will provide a free-world capacity of more than 13,000,000 bbl. per day.

Tax Aid Granted

Platte project is largest of 273 authorized by DPA

WASHINGTON.—Platte Pipe Line Co.'s big 1,075-mile crude line from Worland, Wyo., to Wood River, Ill., is the largest of the latest group of 273 projects granted certificates for accelerated amortization by the Defense Production Administration.

The company, with headquarters at Independence, Kans., was given authorization for fast write-off on 25 per cent of $58,770,563 of the $59,000,000 investment.

Also in the top 10 was a $19,000,000 project of the Sid Richardson Gasoline Co. for production of nitrogen at Pointe-a-la-Hache, La., granted accelerated amortization on 45 per cent of that amount.

Other production certificates went to Stanolind Oil & Gas Co. for $3,381,000 for natural gasoline in Grant County, Kansas, given 65 per cent of $3,327,000 and 40 per cent of $54,000; to Stanolind for $1,029,920 for natural gas in Nueces County, Texas, 65 per cent on $907,410 and 40 per cent on $122,510; and to Barnhart Hydrocarbon Corp. for $38,698 for propane at Big Lake, Tex., 65 per cent.

Transportation.—Certificates for transportation projects went to Consolidated Gas Utilities Corp., for a $124,117 natural-gas pipe line in Stephens County, Oklahoma, 60 per cent; Oil Transport Co., Inc., New Orleans, $111,561 for water transportation, 60 per cent; Pacific Gas & Electric Co., $47,004 for gas-distribution facilities in San Francisco, 40 per cent; Union Oil Co. of California, $1,020,000 for a pipe line, 40 per cent on $874,500 and 25 per cent on $145,500; and Pacific Gas & Electric Co., $85,008 for gas distribution in Solano County, California, 50 per cent.

Storage projects included $55,000 by General American Transportation Corp., at Carteret, N. J.; $175,225 by Hercules Petroleum Corp. at Gibsland, La., of which $170,350 was approved; and $270,000 by Warren Petroleum Corp., at Norsworth, Tex., $157,259 approved, all at 40 per cent.

Contract Carrier

Gulf Interstate's line not revolutionary, just bigger

WASHINGTON. — Construction of Gulf Interstate Gas Co.'s proposed contract carrier of natural gas would be a new development but not a radical departure from a practice already tried out in the natural-gas industry.

The line would transport gas from the Gulf Coast to West Virginia for Columbia Gas System, Inc., on a fee basis *(The Oil and Gas Journal, March 24, 1952, page 80)* and would be the first long line to be constructed specifically for that type of operation. However, considerable gas already is being moved on contract, according to officials of the Federal Power Commission.

Tennessee Gas Transmission Co. is moving 50,000,000 cu. ft. daily for Columbia under contract, and officials said one or two short lines in the interior are operating solely as transporters and at least one other line has similarly transported gas during the summer months.

Good proposition.—From the operating standpoint, it was pointed out, contract-carrier operation is a good proposition. It eliminates the headaches of supply and distribution and cuts through other problems.

A contract carrier would be assured of a stable business, would not be affected by gas-price variations, and

would have little difficulty in securing a transportation rate from FPC which would assure the established rate of return on investment, currently 6 per cent.

Government officials concerned with natural gas and spokesmen for the industry indicated no particular reaction to the idea of contract-carrier transmission systems. They pointed out that the Gulf Interstate line would not be a common carrier in any sense of the word but would be tied in tightly with the company for which it transported gas.

The procedure with respect to securing government approval for construction of the line would be identical with that for any other proposal for a natural-gas system. It would have to receive the approval of the Petroleum Administration for Defense for allocations of line pipe and other controlled materials, and secure a certificate from the Federal Power Commission.

Williston to Be Informed

TULSA.—A long-range program to provide oil-industry information for citizens of the Williston basin was formed here last week at the first meeting of a special subcommittee set up by the Oil Industry Information Committee.

The subcommittee, headed by H. L. Curtis, Shell Oil Co., New York, decided to prepare a special brochure outlining the history of oil development in the new oil-conscious area and arrange a tour of the basin by a forum of oil experts. The subcommittee also will help coordinate public-information efforts of companies already operating in the basin.

E. W. Esmay, acting director of O.I.I.C., New York, participated in the subcommittee discussions.

Tubular-Goods Study Begun

WASHINGTON.—The National Petroleum Council is sending a questionnaire to all users of oil field tubular goods to determine the most desirable range of sizes of casing and tubing used by the oil and gas industry.

The council asked producers to show the pipe actually used in all wells completed during the fourth quarter of 1951, to indicate the type sizes that were available, and to show the pipe tonnage and footage they would have used in these same wells if the desirable sizes and weights had been available, to indicate the proper range of casing and tubing sizes.

Product Exports Drop

WASHINGTON.—Exports of major petroleum products nosedived during the first week in March, dropping to an average of 132,600 bbl. daily from 221,600 bbl. in the preceding week.

Declines from the week ended February 29 were noted in all products except kerosine, but most sharply in distillate.

The average daily exports during the week ended March 7 as compared with the preceding week and with the average for 4 weeks ended March 7, in thousands of barrels, are shown in the following table:

	Week ended—		4 wks. ended
	Mar. 7	Feb. 29	Mar. 7
Aviation gasoline	42.2	65.3	36.2
Motor gasoline	13.1	31.7	22.6
Kerosene	29.5		13.2
Distillate	10.3	72.0	47.4
Residual	37.5	52.6	54.2
Total	132.6	221.6	173.6

Small Operators Can Refile

WASHINGTON.—Small oil and gas operators who were unable to place their priority orders for oil-country tubular goods during the first quarter will be permitted to file for new allotments for the current quarter.

A number of operators found themselves unable to use their authorizations because delays at mills reduced deliveries of pipe to M-6A stocks. These are field stocks reserved for use by operators who normally drill eight or fewer wells a year.

To meet this situation, the National Production Authority has issued Direction 2 to M-46 order to enable PAD to review applications for new allotments.

WATCHING WASHINGTON

Bertram F. Linz

Whopping Investment

The refining industry will spend approximately $2,500,000,000 this year on new plant and equipment, an increase of close to a half billion over 1951, it is estimated by the Securities and Exchange Commission and Department of Commerce.

This will account for approximately 10 per cent of the entire capital expenditures of all business and the 25 per cent increase planned by the oil industry is in strong contrast with the over-all 4 per cent increase now expected.

The joint estimate of the two agencies is only one of a number made by various federal agencies each year, all differing, and its major value is an indication of the trend. However, in the past, actual expenditures have proved pretty close to the Commerce and SEC estimate.

With the exception of 2 years, the refining industry's capital outlay has increased steadily since the war. Petroleum and coal products are linked in the estimates, but the latter accounts for only a small percentage and is probably offset by unreported oil expansions. Thus the estimate of $2,478,000,000 for 1952 probably is not far wrong as an indicator of what will be put into new refinery plant and equipment.

The figures show how vigorously the oil industry has attempted to keep pace with increasing demand. The 1945 investment was $879,000,000, but in the years following expenditures jumped to $1,087,000,000, then $1,736,000,000, and in 1948 to $2,100,000,000. The following year it dropped to $1,789,000,000, and in 1950 to $1,587,000,000, but it bounced back in 1951 to $2,014,000,000.

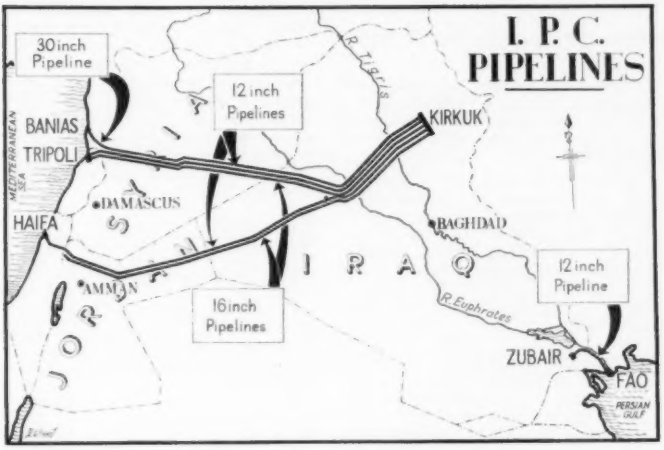
What Marshall Plan Did

Marshall-plan funds distributed by the Economic Cooperation Administration during the 45 months of the European recovery program worked two ways. It provided supplies of needed products and materials for the participating nations and built up production and markets for practically all the countries outside the Communist orbit.

How this dual purpose was achieved is exemplified by the case of oil. The European countries received authorizations for $1,262,300,000 for the procurement of petroleum and products, but only $306,800,000 of this was spent in the United States.

A much larger sum, $494,000,000, was spent in the oil-producing areas of the Middle East; almost as much, $305,300,000, went to the dependencies of the participating countries, and $156,100,000 was spent in Latin America.

Just how important the postwar demand for oil, spurred by Marshall-plan funds, has been to the Middle East was revealed recently in material compiled for use in consideration of the mutual-security program for 1953. In the case of Iran, oil exports which amounted to $114,400,000 in 1938 jumped to $473,500,000 in 1950. Also in this year exports of all other commodities combined amounted to only $55,000,000. Imports in 1950 amounted to $286,800,000, and the loss of her oil trade last year meant that Iran had to cut her purchases abroad almost to the vanishing point.



MIDDLE EAST

Kirkuk Oil Moving

I.P.C. announces arrival at Banias, Syria, of initial shipments through its new 30 and 32-in. crude carrier

Dahl M. Duff

CRUDE oil from Kirkuk field has reached the eastern Mediterranean through the new 30 and 32-in. line of Iraq Petroleum Co., Ltd., and initial tanker shipments are due to begin by mid-April.

Completion of the project provides the means for laying down an additional approximately 300,000 bbl. daily of crude oil on the Mediterranean coast. Its 32-in. sections make the line the world's largest in crude-oil service.

Though the line was conceived long before the Iranian nationalization, its construction was accelerated after the situation in that country became critical. Middle East crude production has already overcome the Iranian loss, but the Kirkuk oil to be delivered through the new line is non-dollar production, which is favored in Europe because of the exchange shortage of such countries as Britain and France.

Work continues.—Initial movement of crude through the 30 and 32-in. line was made possible by its completion from the new terminal at Banias, Syria, to Station K-3 on the Euphrates River and by using excess capacity in the existing 12 and 16-in. system from Kirkuk to K-3. Meanwhile, work continues laying the 30 and 32-in. from K-3 to Kirkuk, and completion of this final 149-mile section is due by the end of April. Full capacity of the total 556-mile line will not be reached, however, for some time because of the still-unfinished pump stations.

The tie-in weld at K-3 was made February 21, and by March 6 the line had been filled as far as Station T-2. No water tests had been made, and the testing with oil revealed only one break to this point. Since then a final 4-mile section into Banias has been completed.

Pumping continues.—Announcing the arrival of the first crude in Banias, I.P.C. said that pumping is continuing into the tankage at Banias. Storage at the terminal amounts to 550,000 tons, or about 4,200,000 bbl. I.P.C. placed cost of the line at £43,000,000 or the equivalent of $120,000,000 at the official rate of exchange.

The company said the new line, when in full operation, will carry an additional 14,000,000 tons (about 290,000 bbl. daily) of crude to the Mediterranean. It is estimated that during 1952 total production from Kirkuk will exceed 14,000,000 tons. At present, Kirkuk production moves to Tripoli, Lebanon, through the north branch 12 and 16-in. lines. The south lines into Haifa are being maintained but not operated because of the Arab-Jewish strife.

Ahead of schedule.—Initial shipments through the new line will be about 6 months ahead of the original schedule followed before the speed-up program was decided on last August. (*The Oil and Gas Journal, January 7, 1952, page 52.*) The line is being built by Arabian Bechtel Co., and the first weld was made in November 1950.

With operation of the Banias terminal, this short section of the Syrian-Lebanese coast becomes one of the world's largest oil-exporting centers. To the south of Banias is Tripoli, I.P.C.'s existing terminal. Farther south is Sidon, the terminal for Trans-Arabian Pipe Line Co.'s 30 and 31-in. line from Saudi Arabia which was finished late in 1950.

I.P.C. recently inaugurated a 12-in. line in southern Iraq to bring Zubair field on commercial production. The company is making plans to lay a line from Ain Zalah field in northern Iraq to a junction with the main Eastern - Mediterranean system at Station K-2 on the Tigris River.

LOADING UP.—Conveyor receives 30 and 32-in. pipe in I.P.C.'s denesting yard at Homs, Syria, during construction operations.

Rioting in Iran

New outbreaks of violence bring martial law in Teheran; more uprisings, financial trouble may topple government

TEHERAN is under martial law as a result of the worst outbreak of violence since the demonstrations last summer when W. Averill Harriman visited the country and unsuccessfully attempted to settle the oil issue.

The recent riot was between Communists and Iranian police. A Communist parade supporting Chinese charges the United States is using germ warfare in Korea ended in gunfire, five dead (including two policemen), and about 200 injured.

Anticipating the possibility of further violence, the government slapped a ban on meetings of more than three persons and placed the capital under a dusk-to-dawn curfew. The martial law was decreed to last a month.

Oil situation.—Meanwhile, the oil question had lapsed back into a waiting game following the collapse of the World Bank's settlement efforts. The eventual fall of the present Iranian Government under the pressure of financial difficulties and Communist-inspired disturbances is now expected.

On its side, the Iranian Government apparently still believes the United States will come to its rescue on the theory that the Communists will gain control of the country otherwise.

The British position is gaining strength constantly in that the need for Iranian products is becoming less and less with the construction of additional refining capacity. The crude-oil deficit has been completely made up to the point where there is increasing concern over the possibility of an oversupply later this year which will react unfavorably on dollar-oil production abroad.

Iranian plans.—The Iranian Government's plans at this point were indicated by Prime Minister Mossadegh in a report to three members of the Iranian senate following the departure of the World Bank mission.

"For the sake of a few million pounds sterling, we should not lose our independence of action," he said. "The oil question is bound to be settled one day, and then we can use the oil resources for reconstruction schemes."

In regard to internal economic conditions, Mossadegh reminded the senators that Iran never had had a balanced budget. The volume of government services had tripled in the last 10 years. He asked the senate to collaborate with the other branch of parliament, the Majlis, to create an economic program completely independent of oil income.

Mossadegh charged "agents of the former oil company"—Anglo-Iranian Oil Co., Ltd.—with responsibility for the country's troubles, both inside and outside Iran.

He said the company representatives are seeking to prevent others from coming to settle the oil problem. When the senators inquired as to internal security, the prime minister said these conditions were no worse than before and that the troubles had been engineered by former company agents.

Further talks doubtful.—Commenting in London on the failure of the World Bank's efforts to settle the oil dispute, Hector Prudhomme, bank loan officer and negotiator in Iran, said the difficulty was that "we were dealing with political men not business men." His remarks left little hope that the bank will attempt to resume its discussions with the Iranian Government in the near future.

The bank's proposal to return British technicians to Abadan and the fields was flatly turned down by the Iranians, Prudhomme said. When the Iranian Prime Minister, Dr. Mossadegh, was in Washington, however, he had given the bank the understanding that it could have full freedom in the operation, including the use of such technicians as were necessary, he said.

What Prudhomme had to say on the reasons for the collapse of the bank's negotiations again raised the question as to whether any workable solution to the oil issue is possible with the present government in power in Teheran. The Iranian Government is unquestionably running short of money. Although opinions differ on how long a crisis can be postponed, many in the industry feel it best to let economic events in Iran take their course.

American loan.— Another development in the Iranian deadlock was a statement by the U. S. State Department in Washington explaining why no action had been taken on Iran's request for a $120,000,000 loan. Earlier, speaking before a group of touring American news and radio executives in Teheran, Dr. Mossadegh had charged that President Truman refused to authorize the loan unless British terms for settling the oil issue were accepted.

The State Department said that the United States "could not justify aid of the type requested at a time when Iran has the opportunity of receiving adequate revenue from its oil industry without prejudice to its national aspirations." Its statement continued:

"It has been pointed out that the United States is bearing a heavy financial burden in its efforts to help bring about a stable and lasting peace and that it is most difficult to undertake additional commitments to a country which has the immediate means of helping itself. The United States has not . . . established as a condition for granting financial aid to Iran that the Iranian Government should accept any particular proposals."

A.I.O.C. Staff Scattered

The extent of the dispersal of the former Iranian staff of Anglo-Iranian Oil Co., Ltd., is shown in an announcement of the company that about 2,000 persons have left the organization since the evacuation from Abadan last summer.

Before withdrawal of personnel began as a result of the nationalization dispute, Anglo-Iranian's British staff in Iran numbered 2,600. These technicians were given paid leave while the situation was under study. About 1,000 applied for help from a special resettlement panel, and of these, approximately two-thirds found jobs with this assistance or through their own efforts.

The 2,000 who have left company employment include some members of the home staff in Britain, but most of them were former technicians in the fields and refineries in Iran. Of the former Iranian staff still with the company, some have been placed with the home organization and others with associated or subsidiary companies.

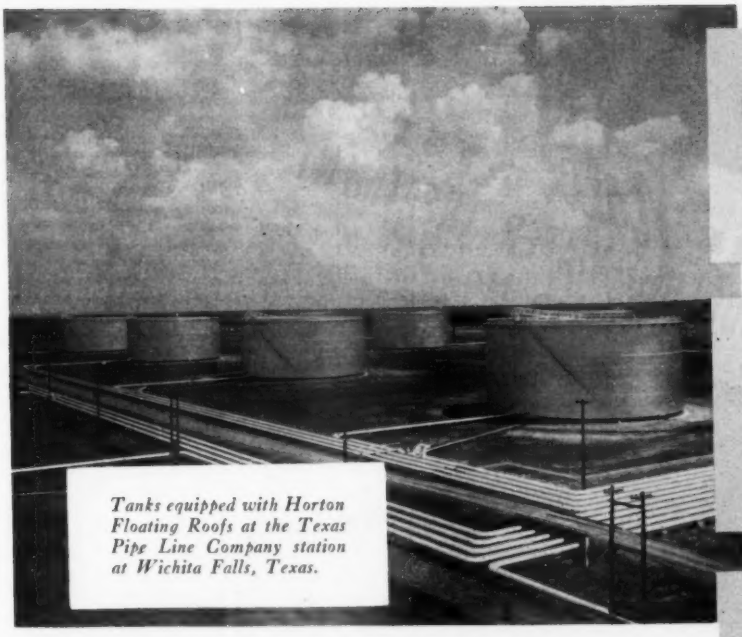
Anglo-Iranian's statement indicated that the men who formerly operated the properties in Iran would not be available if a settlement of the oil question were reached. Although the present Iranian Government told the World Bank it would not consent to the return of the former British technicians, this group obviously was the only one that could direct a resumption of production on any fairly short notice.

Israel Says Companies Ready

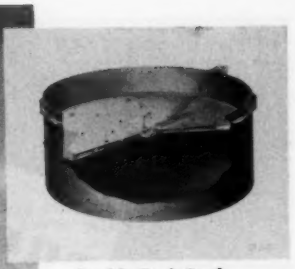
Representatives of Swiss and United States companies have indicated their readiness to participate in exploration work in Israel, according to Israeli government officials in Tel Aviv.

The Israeli parliament now has before it a proposed oil law dealing with exploration, concession, and other oil activities. No definite work can be undertaken until this bill is approved.

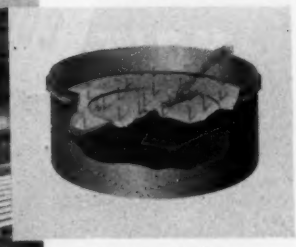
Earlier, it had been reported that a group of Swiss, United States, and Israeli industrialists, which had already invested in cement and asbestos manufacturing in Israeli, was pre-



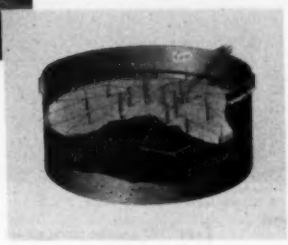
Tanks equipped with Horton Floating Roofs at the Texas Pipe Line Company station at Wichita Falls, Texas.



Double Deck Roof



Pontoon Roof



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The Horton Pontoon Floating Roof has an annular pontoon and a center section of single thickness. The pontoon ring is compartmented by radial bulkheads to assure stability. Trusses are placed inside the pontoon compartments to provide stiffness.

The Horton Pan Floating Roof has a deck of single thickness with a vertical rim at the periphery. The deck is coned downward toward the center to provide drainage. It is held in this position by a series of radial rafters attached to the underside of the deck and radial trussing above the deck.

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Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
San Francisco, 4.....1544—200 Bush St.
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Compressor Station	4,800	1,200	This job was almost impossible to treat. Results are excellent.
Chemical Plant	2,100	1,000	Condensers have been in service two years without cleaning. No scale or plugging of tubes due to bacteria or slime was found within that time.
Steel Mill	1,200	40	Results are excellent. High skin temperatures in furnace are experienced but no corrosion or scale has been found in these hot sections since using No. 33.
Distillery	4,300	200	Very good. They experienced considerable slime before starting treatment. The lower pH permitted slime control with economical dosages.
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pared to put up money for oil drilling and that a leading Swiss bank also would participate. Under the old British mandated government in Palestine, the Iraq Petroleum Co., Ltd., organization held a concession in the country and had one well drilling which had to be suspended because of the lack of security.

Sheik to Rebuild Kuwait

A 15-year plan for the rebuilding and expansion of the town of Kuwait using the sheikdom's greatly increased oil revenues has been approved in principle by the ruler, Sheik Abdulla Al Salim Al Subah.

The scheme provides for almost complete reconstruction of the city and additional buildings to accommodate expected increases in population. The plan was drawn up about a year ago at the sheik's request by a British firm of town-planning consultants.

Most of the approximately 150,000 inhabitants of the arid, 6,000-sq. mile sheikdom live in Kuwait town. Before the prosperity following the development of what is conceded to be the world's largest single oil field, walled Kuwait town was a relatively poor community whose residents derived most of their money from the trational industries of boating, building, and pearling.

Various estimates have been made of the amount of money that will accrue to Kuwait's sheik as a result of the 50-50 profit-sharing agreement announced in London December 3. One estimate is that his income will amount to about $140,000,000 annually, most of which will go to the welfare of his Moslem tribesmen in such projects as the town rebuilding and construction of water-distillation plants, hospitals, schools, and power stations.

EUROPE

Gas Wells Out of Control

Gas wells had blown out and were out of control last week in two European areas, the Soviet zone of Austria and northern Italy.

Near Cremona in the northern part of Italy's Po Valley, a high-pressure gas well blew out and caught fire March 22. The flames were seen over the countryside, and it was expected that fire-fighting specialists would be called from the United States.

Reports from Vienna said gas which has been flowing uncontrolled since March 16 at a Russian well at Zwerndorg, lower Austria, now threatens to catch fire. The derrick was in danger of falling, and the Russian operators were spraying the area with water in an effort to prevent fire. The gas from the well also was bringing up crude oil and some lignite (brown coal).

Russian oil operations in Austria have been plagued with a number of blowouts and fires. Last year at Matzen a disastrous well fire lasted several months.

Stanlow Cracker Operating

A final stage of the postwar refinery expansion program of the Shell organization in the United Kingdom has been completed with the beginning of operations in the new catalytic cracking unit at the Stanlow refinery in Cheshire.

The new catalytic unit has capacity to produce 1,000,000 tons of high quality products annually (about 20,600 bbl. daily). The Stanlow refinery is operated by Shell Refining & Marketing Co., Ltd., and has a crude capacity of 86,800 bbl. daily, including 12,500 bbl. daily for topped crude.

The Stanlow cracking unit is the second Shell catalytic plant to go on stream in Western Europe. The first unit with a capacity of about 25,000 bbl. daily was placed in operation at the Group's 104,500-bbl. daily refinery at Pernis, in the Netherlands. A similar unit is to be erected at Shell's Berre - L'Etang refinery in southern France.

NEW FLUID UNIT.—This is the new catalytic cracking unit at Shell's Stanlow refinery in Britain. The unit and auxiliaries cost about $22,400,000. (Shell photo.)

The Stanlow catalytic cracking unit will not only increase production of motor fuel but also will lead to a close integration of the refinery operations with the adjacent chemical plant. The latter will be able to increase its production of such petrochemicals as acetone. Moreover, the catalytic unit will result in the recovery of about 10,000 tons a year of sulfur by providing feed stock for a sulfur-recovery plant now nearing completion. Eventually, other byproducts from the unit will furnish raw material for the production of tetraethyl lead by the Associated Ethyl Co. at its new plant at Ellesmere Port, Cheshire.

Refining Halt Considered

A prohibition against the construction of further new refining capacity in Italy has been recommended by the government's Petroleum Committee.

The decision was taken in view of the fact that present Italian capacity is considered more than capable of meeting domestic requirements. The present condition of the domestic market does not permit absorption of larger quantities of products, and because of Italy's credit balance in the European Payments Union, products exports are becoming difficult. Before the committee's recommendation becomes effective, a decree will have to be issued by Italian Ministry of Industry and Commerce.

Last year, throughput of Italian refineries gained about 32 per cent over 1950 as a result of the opening of several new plants and expansion of others. Total throughput was 4,828,-839 metric tons (about 96,500 bbl. daily) last year against 3,649,116 tons (73,000 bbl. daily) the previous year. Consumption of all products except paraffin also showed sharp gains in 1951.

Electronic Controls in Use

Anglo - Iranian Oil Co., Ltd., has commissioned at its Llandarcy refinery in South Wales what is said to be the first electronically controlled refinery unit.

The unit produces premium-grade kerosine and is now operating at a rate of 500 long tons daily against a design capacity of 330 tons daily. Electronic measuring and control instruments are used exclusively in the plant for flow, pressure, and level control.

Operation is by the Evershed Electronic System, which overcomes difficulties due to the distance between measuring points and the plant control room. Electronic equipment eliminates lags in measurement and control correction inherent in a pneumatic control system because of air

compressibility in transmission lines. In the electronic system, deviations from required quantities of flow, pressure, or level are detected and corrected instantaneously.

AUSTRALIA

Seismic Work to Start Soon

Seismograph work is expected to be started in May by West Australia Petroleum Pty., Ltd., as a preliminary to locating the site for its first test in the Exmouth Gulf area of northwest Australia.

The company is a joint undertaking of Caltex Oil (Australia) Pty., Ltd., and the Australian company, Ampol Petroleum, Ltd., which was recently organized to explore over 350,000 sq. miles of virtual desert territory in Western Australia.

In Perth, C. T. Newcombe, general manager of the West Australia, said actual drilling should start late this year. About 3,000 tons of drilling equipment is being assembled in the United States for shipment to the site and is expected to arrive in June.

An announcement by Caltex in New York said the first geological field party had returned from the area. Caltex said that "undue optimism on the assumption that oil will be found is not consistent with the completely unexplored nature of this vast area."

The area of operations is about 800 miles from the nearest deep water port at Fremantle. The arid desert-table land with bare stone outcroppings compares in appearance with the Nevada-Utah area 50 or 60 years ago. It offers considerable problems of supply, including that of water and route and method of transporting the equipment.

ASIA

Refinery Plans Expanded

The new refinery which the Burmah-Shell organization is preparing to build in India will have a capacity of 2,000,000 tons (about 40,000 bbl. daily) instead of the 1,500,000 tons originally announced.

Announcing this increase in capacity of the project, the company said in Bombay that the revision would not change the anticipated time of completion in early 1956. Standard-Vacuum Oil Co. also is planning a refinery in the Bombay area which will have a capacity of 19,000 bbl. daily.

The Burmah-Shell plant will be located at Trombay, near Bombay. The two parent organizations, Royal Dutch-Shell and Burmah Oil Co., Ltd., recently organized the new Burmah-Shell Refineries, Ltd., to operate the refinery.

The company will be incorporated as a private company but will be converted to a public company later. Burmah-Shell reached agreement in December with the Indian Government for the construction of the refinery, to cost the equivalent of about $46,000,000 and be completed in 1956.

Under terms of the government agreement, £1,500,000 of the shares of the Indian operating company will be offered to Indian investors in the form of cumulative preference stock. This may be raised to £2,250,000 if the Indian Government wishes. Another feature of the agreement is a government guarantee against nationalization or compulsory acquisition for 25 years.

Pakistan Refinery Planned

Burmah Oil Co., Ltd., has disclosed plans for the construction of a new refinery in Pakistan with a capacity of about 10,000 bbl. daily.

The company announced in Karachi that it had reached agreement with the Pakistan Government for the plant's construction and said that a technical group is now studying possible sites.

The proposed refinery is the latest of a number of new refineries announced for Southeast Asia and the Far East since the shutdown in Iran. In India, the Burmah-Shell organization is preparing to build a 28,000-bbl. plant. Only present refinery in Pakistan is Attock Oil Co., Ltd.'s 4,800-bbl. daily plant in West Pakistan which processes the small country's small domestic production.

AFRICA

Egypt May Ease Oil Law

The Egyptian Government last week indicated that it will strike out a clause in its 1948 companies agreement to which oil companies operating in the country have been objecting for nearly 4 years.

This is the provision which requires 51 per cent Egyptian ownership. The minister of commerce and industry said in Cairo that he was bringing before the cabinet an amendment allowing foreign investors to retain 51 per cent control of Egyptian corporations and companies domiciled in Egypt. He indicated that the cabinet had already approved in principle.

This presumably is part of the overall settlement of outstanding differences which the companies are seeking with the government. Egypt has already provided limited relief from the arbitrarily depressed price at which the companies have been forced to sell on the local market.

So far the companies apparently have been offered nothing in the way of assurance that exploration blocks will be converted to production concessions.

These operational drawbacks and the lack of firm remedial action by the government were the primary motivating factors in the withdrawal of one firm, Standard Oil Co. (N. J.), from the country, and the discontinuance of all exploratory work by the other two, Anglo-Egyptian Oilfields, Ltd., and Socony-Vacuum Oil Co., Inc.

LATIN AMERICA

Dificil Plant Contracted

Contract for design and construction of a natural-gasoline plant for the Shell organization in Dificil field in Colombia has been let to Lummus Co., Ltd., London.

Anglo-Saxon Petroleum Co., Ltd. (Shell), said in London that the plant will process about 20,000,000 cu. ft. daily of wet gas together with a small flow of raw distillate for the recovery of L.P.G. motor gasoline, and finished distillate. The plant will be a completely self-contained unit, with its own power plant, cooling water system, and tankage. It will be operated by Concesionaria de Petroleo Shell-Condor.

I.S.A.P. Meeting Planned

The permanent international committee of the South American Petroleum Institute (I.S.A.P.) will hold its eighth meeting April 21-26 at Cochabamba, Bolivia.

The committee will consider a proposed change in the name of the parent organization, set the date for the next American Petroleum Congress, and consider new bylaws providing for admission of all countries in the Western Hemisphere.

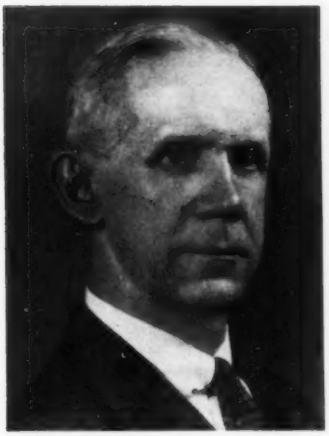
The Cochabamba meeting will be attended by delegates from Argentina, Bolivia, Uruguay, Brazil, Chile, Ecuador, and Peru, which now have I.S.A.P. chapters. Technical men from other countries also have been invited to attend.

International Briefs

Oil has been tested in a well in the Adalar district of Turkey. Radio Ankara said the discovery was made at a depth of about 6,000 ft. Oil exploration in Turkey is by a government mining institute which has developed Ramandag field, now largely shut-in, in southeastern Turkey.

The new Italian discovery of Azienda Generale Italiana Petroli at Bordolano, near Parma, has shown gas and distillate production from a depth of about 8,200 ft., according to reports from Europe. Pressures recorded in the well ranged up to 300 atmospheres (about 4,400 psi.).

PERSONALS



Jacobsen Honored

Amerada head knighted by King Frederik of Denmark

ALFRED JACOBSEN, president of Amerada Petroleum Corp. for the past 23 years, has been knighted by King Frederik IX of Denmark, who awarded him the Knight Cross of the Order of Dannebrog in recognition of distinguished services in promoting cultural and commercial relations between the United States and Denmark.

The presentation was made by Ambassador Henrik Kauffman at the Danish Embassy in Washington.

Jacobsen heads the firm which in recent years has been credited with several major field discoveries in the United States, the latest of which was the Williston basin discovery of a year ago. *(For a detailed article on developments since then in the Williston basin see page 75).*

At the age of 18 Jacobsen left Denmark for Mexico. For the next few years he sold hardware, clerked for a lawyer, and then entered the banking business. After gaining a thorough knowledge of Mexican land laws he became associated with Mexican Eagle Oil Co.

Within 6 years he became the company's managing director, and in 1926 he left Mexican Eagle to join Amerada in the United States as vice president. In 1929 he was named president of the firm.

Jacobsen has been active for many years in the American Petroleum Institute and associated organizations. During the war he headed the foreign division of the National Petroleum Council. He makes his headquarters in the New York City offices of the company.

Charles Fitzgerald, vice president of Sinclair Pipe Line Co., and **H. J. Amend,** auditor, have been elected directors of the company.

L. F. J. Teyssot, formerly fields manager of Basra Petroleum Co., Ltd., has been made general manager of the company, an affiliate of Iraq Petroleum Co., Ltd. Teyssot joined I.P.C. in 1939 after spending 16 years in various industry positions in California, Romania, Venezuela, and Tunisia.

Hal J. Jones, formerly physicist for Engineering Research Associates at Salt Lake City, has joined Stanolind Oil & Gas Co. at Big Lake, Tex., as research engineer.

Ed. B. Nickelson has been appointed petroleum engineer for Continental Oil Co.'s central region, with headquarters in Oklahoma City. He succeeds **G. T. Pearson,** who recently resigned.

Wallace B. Pardoe has been placed in charge of operating and development activities under the newly established Tulsa office of Seminole Oil & Gas Corp.

E. P. Neal, district geologist for Tide Water Associated Oil Co. at Tulsa, has been promoted to regional geologist at Tulsa. He will supervise geological activities in Oklahoma, Kansas, and the Texas Panhandle. **Lyman E. Galbraith** has been promoted to district geologist at Oklahoma City.

Weldon J. Grinnan, geologist for Lion Oil Co., has been transferred from Denver to Bismarck, N. D.

C. C. STEINBERGER

C. C. Steinberger, Jr., divisional manager of Midstates Oil Corp.'s land and geological departments for coastal Louisiana and the Texas Gulf Coast, has resigned and opened offices in Houston as an independent. He has been active in this area for the past 20 years, having been one of the earliest producers in Conroe field of Montgomery County, Texas.

C. H. Thurber, formerly assistant geophysicist for Plymouth Oil Co. at Odessa, Tex., has joined Continental Geophysical Co. as supervisor at Oberlin, Kans.

G. F. Waley, formerly manager for the Latin American area of the Shell group in London, has been appointed to the newly created post of assistant to the managing directors of the group. He has been with the Shell organization since 1919.

A. K. Smith, formerly treasurer of Bell Oil Co., Los Angeles, has been elected vice president in charge of exploitation. He succeeds **K. R. Evans,** who has resigned to engage in private practice as a petroleum engineering consultant at Bakersfield, Calif.

F. M. Banks, president and general manager of Southern California Gas Co., Los Angeles, has been appointed chairman of the 1952 Distinguished Service Award Committee of the American Gas Association.

S. R. Simmons, manager of the southern division of Interstate Oil Pipe Line Co., Shreveport, has been elected a member of the board of directors succeeding **S. W. Day,** vice president, who retired recently after 47 years with Interstate and its predecessor companies. Simmons, who has had 39 years of pipe-line experience, joined Standard Oil Co. of Louisiana in 1913. In 1945, when Standard's pipe line properties were acquired by Interstate, he was named assistant general superintendent of Interstate's southern division.

Clarence A. Wiggins, Midland, Tex., independent operator, has been named director and president of Drilling & Exploration Co., Inc., of Abilene, Tex. **John E. Brantly,** former president, was elected chairman of the board. Wiggins was formerly associated with Adams Oil & Gas Co., until 1943 when he became an independent operator in Texas and Louisiana.

Lee J. Thronson, formerly area superintendent for Sun Oil Co. at Premont, Tex., has joined Mendota Oil Co. at Fort Worth, Tex., as production manager. Thronson has been with Sun since 1938.

Asa D. McRae, geologist for Magnolia Petroleum Co. at Lake Charles, Ill., has been transferred to Mount Vernon, Ill., and promoted to district geologist in charge of the Illinois district.

Melvin I. Smith, of the technical service department of Socony-Vacuum Laboratories, Brooklyn, and **Sidney M. Foulks,** of the field research laboratories of Magnolia Petroleum Co., Dallas, a Socony-Vacuum affiliate, have been selected to receive the 1952 Incentive Fellowship Awards for advanced study from

PERSONALS

Socony-Vacuum Oil Co., Inc. These fellowships are offered to encourage scientific studies by company people.

J. E. WILSON

J. E. Wilson, Shell Oil Co.'s division geologist at Oklahoma City, has been selected for a 6-month assignment at The Hague, The Netherlands. **E. C. Taber, Jr.,** Shell's North Texas division geologist, is replacing Wilson in the Oklahoma division, and **George H. Thompson, Jr.,** has been transferred to Wichita Falls, Tex., and promoted to North Texas division geologist succeeding Taber. Wilson joined Shell in 1938 after graduating from Texas A. & M. College, and became Oklahoma division geologist in 1947. Taber has been with the firm since 1939, and Thompson since 1941.

E. C. TABER, JR.

G. THOMPSON, JR.

Emile E. Soybrey, director of Standard Oil Co. (N.J.) since 1949, has been elected a vice president. **David A. Shepard,** until recently an executive assistant to the president, was elected a director.

J. F. Homer, assistant division petroleum engineer for Humble Oil & Refining Co. at New Orleans, has been transferred to Grand Isle, La., and promoted to assistant district superintendent.

James K. Moore has been promoted to crude-oil supervisor of Shell Oil Co. at Houston. Moore will be responsible for the purchase, sale, and transportation of crude oil as well as coordination of activties of the company's various area crude-oil departments. **James R. Willett** has been promoted to traffic supervisor in the crude-oil department.

B. G. Kegley, drilling superintendent for Signal Drilling Co. at Edgerton, Wyo., has been transferred to Casper, Wyo., as drilling superintendent for Signal Drilling, Signal Exploration, Inc., and Pennant Drilling, Ltd.

Don D. Little has been named senior reservoir engineer for Standard Oil Co. of California at San Francisco.

W. C. Harney has been promoted to assistant head of Esso Standard Oil Co.'s Bayway, N. J., refinery laboratory. He was formerly supervisor of alcohol and white oil pilot-plant work in the chemical-products laboratory.

E. D. Manly, exploitation engineer for Shell Oil Co. in the Odessa, Tex., division office, has been transferred to New York City. **C. F. Blankenhorn,** laboratory supervisor at Odessa, was appointed exploitation engineer. **G. B. Young,** rotary driller at Hobbs, N. M., has been named drilling foreman there.

A. K. Brumbaugh, chief design engineer of General Petroleum Corp. at Los Angeles, has resigned to join the refinery engineering department of Socony-Vacuum Oil Co., Inc., at New York City.

John C. Sample has rejoined General Petroleum Corp. after an absence of 3 years and will become assistant to the president on May 1. For the past 3 years he has been with Standard-Vacuum Oil Co. in New York in charge of that firm's marketing activities in South Africa, Australia, New Zealand, and Japan.

Raymond R. Burdette, of St. Louis, has been promoted to chief of the right-of-way department of Sohio Pipe Line Co.

Hines H. Baker, president of Humble Oil & Refining Co. at Houston, has been awarded the 1952 good citizenship gold medal, awarded annually by the Paul Carrington chapter of the Sons of the American Revolution.

Hillord Hinson, chief geologist for J. S. Abercrombie Co. at Houston has opened consulting offices in Houston. Hinson has been with Abercrombie since 1937.

J. R. Martin, assistant instrument foreman at Humble Oil & Refining Co.'s Baytown, Tex., refinery, has been elected vice president of the Houston section of the Instrument Society of America. **R. E. Hughes,** instrument engineer for Shell Chemical Co. at Deer Park, Tex., was elected treasurer of the society.

Denver Petroleum Club Elects Officers

David I. Sheppard, left, of Lion Oil Co., receives congratulations of Clarence Bainter, center, National Supply Co., retiring president, following his election to head the Denver Petroleum Club during the coming year. Other new officers, left to right, are James E. Fenex, Continental Oil Co., second vice president; Russell Volk, Plains Exploration Co., first vice president; and Oscar S. Wood, American Petroleum Industries Committee, secretary-treasurer. Wood received the club's 1951 "Man of the Year" Award. In the two previous years the citation had been made, it was awarded Leslie Parker, independent producer, and Maury Goodin, Petroleum Information, Inc.

PERSONALS

B. David Meltzer, drilling engineer for The California Co. at Harvey, La., has been transferred to Cranfield, Miss., as development engineer.

W. A. Gorman has been appointed vice president and chief geologist of Rycade Oil Corp. of Houston. Prior to joining Rycade on March 15, Gorman served as manager of the Houston division of Royal Oil & Gas Corp. for 10 years. He has B.A. and Ph.D. degrees from the University of Minnesota.

Donald G. Covert, formerly design engineer for Standard Oil Co. (Ind.) at Sugar Creek, Mo., has joined Mid-Continent Petroleum Corp. at Tulsa as junior process engineer.

W. Lloyd Haseltine, formerly at Mount Vernon, Ill., with Magnolia Petroleum Co., has been promoted and transferred to Dallas as regional geologist in charge of development.

Nathan L. Johnson, formerly with Monarch Logging Co., has joined Tide Water Associated Oil Co. as assistant geologist at Midland, Tex. Others who have recently joined the firm include: **Harry Lee Frank,** formerly with Magnolia Petroleum Co., now assistant geologist for Tide Water at Houston; **Ralph D. Armstrong,** formerly with the Texas Highway Department, now assistant geologist at Houston; and **Lawrence J. Andrus,** formerly of the University of Houston, now engineer trainee at Houston. **Norvin R. Griffin** has been promoted to crude-oil representative at Midland.

Oran W. Mitchell, intermediate petroleum engineer for Sinclair Oil & Gas Co. at Midland, Tex., has been transferred to Big Spring, Tex. Others transferred or promoted by the firm include: **Theodore F. Hoss,** district foreman at Wink, Tex., transferred to Seminole, Okla.; **Lindal Buchanan,** intermediate petroleum engineer at Ardmore, Okla., transferred to Oklahoma City; **Cameron L. Cox,** intermediate petroleum engineer, located at Columbus, Tex., promoted to assistant foreman; **Bobbie L. Howell,** junior petroleum engineer at Tulsa, promoted to intermediate petroleum engineer at Ardmore; **Charles L. Simons,** intermediate petroleum engineer at Thrall, Kans., promoted to senior petroleum engineer at Delaware, Okla.; **Claude D. Gaines,** senior petroleum engineer at Ardmore, promoted to division engineer at Tulsa; **Dennis L. Krehbiel,** junior petroleum engineer at Thrall, promoted to intermediate petroleum engineer there; **Vernon L. Hughes,** junior petroleum engineer at Lindsay, Okla., transferred to Tulsa; **Chester R. Smith,** junior petroleum engineer at Odessa, Tex., transferred to Big Spring; and **Joseph P. Collins,** junior petroleum engineer at Delaware, transferred to Thrall.

R. R. Sanderfer, tool pusher for Henderson Drilling Co., has been transferred from Humble, Tex., to Houston.

Dick Horton has resigned from Sinclair Oil & Gas Co. to join Iley B. Browning & Sons at Henderson, Ky., as geologist and scout.

John R. Lavens, Jr., and **Carl L. Pate,** partners in Oil Field Research Laboratories, have opened a new office at Evansville, Ind., where they will serve as consultants and core and reservoir analysts to water-flood operators in the Tri-State area. Lavens will manage the new office, while Pate will continue to headquarter from the Chanute, Kans., office which was established in 1941.

R. H. McKinley, district geologist at Wichita Falls, Tex., for Panhandle Producing & Refining Corp., has been promoted to chief geologist at Dallas.

J. C. Price, formerly geologist with Magnolia Petroleum Co. in the East Texas area, has joined Lion Oil Co. as district geologist at the firm's newly established office at Tyler, Tex.

Harris H. Allen, formerly district geologist for Phillips Petroleum Co., has been named manager of the firm's land and geological department of the Houston district. **T. E. LeRoy** has been transferred from Lafayette, La., to Houston to become district geologist, and **S. K. Childers,** of Wichita Falls, Tex., has moved to Houston as district land man.

E. B. Coolidge, Great Falls, Mont., has been elected chairman of the newly appointed Montana Oil Conservation Board. **H. F. King,** Billings, and **John Bukvich,** Butte, are other new members appointed to the board by **Gov. John W. Bonner.** Holdover members are **LaRue Smith, Jr.,** Great Falls, and **Peter A. Thomson,** Billings.

DEATHS

W. L. Kistler, 67, Tulsa oil executive, died April 2 while on a business trip to Santa Barbara, Calif. He was one of the founders of Producers & Refiners Corp., which became an important organization in the Mid-Continent and Rocky Mountain area. In recent years he has operated as an independent producer with large holdings in the Southwest.

Julian Wood Glass, Sr., 71, prominent Nowata, Okla., oil man and attorney, died there April 2. Glass had spent 41 years with Henderson Oil Co., serving as vice president and counsel, and as chairman of the board of trustees.

Thomas J. Hilliard, prominent for many years in the Pennsylvania oil industry, and at one time head of Waverly Oil Works Co., died March 26 at Oil City, Pa.

Herman C. Helmle, 58, district engineer of Asphalt Institute, died recently at Springfield, Ill.

John P. Carroll, formerly oil dispatcher at Kansas City, Mo., for Sinclair Pipe Line Co., died March 25.

Harry L. Stewart, 71, retired official of The Texas Co., died in Tulsa April 2. He had been with the Texas firm for 42 years, retiring in 1945 as a director and secretary-treasurer of Texas Pipe Line Co. of Oklahoma, Texas-Empire Pipe Line Cos. of Oklahoma, Illinois, and Texas and Kaw Pipe Line Co., all subsidiaries of Texaco.

Oscar L. Garrett, coowner of Petroleum Tool Co. of Odessa, Tex., died at Rochester, Minn., on March 22.

Robert Louis Carter, 49, of Humble Oil & Refining Co.'s Baytown, Tex., service laboratory, was killed in an automobile accident recently.

W. R. Quin, 57, independent operator of San Antonio, Tex., died March 24.

Jackson Evader Josey, Jr., independent operator and president of Pine Lodge Oil Co., died March 28 at Houston.

Walter R. Hanby, 66, who retired in 1949 as manager of domestic-sales division of Esso Standard Oil Co. in New Jersey, died March 28 in Elizabeth, N. J.

Lee R. Payne, 58, oil producer who was also associated with Herndon Drilling Co., died April 1 in Tulsa.

Linn M. Rakestraw, 60, manager of the marine department of Foster Wheeler Corp., died March 23 in New York City.

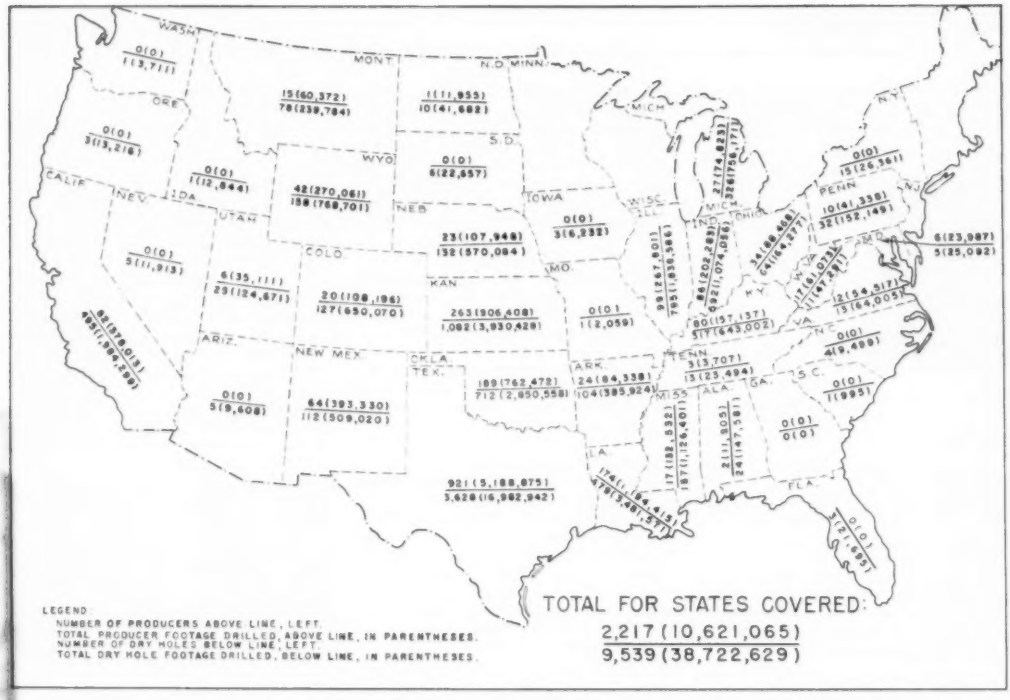


Fig. 1—Dry holes and producing wells resulting from exploratory drilling in 1951, and footage drilled for each.

EXPLORATORY DRILLING IN 1951

by Frederic H. Lahee*

1951 vs. 1950

1. In number of exploratory holes drilled there was an increase of 14.1 per cent, and in exploratory footage drilled there was an increase of 22.8 per cent.

2. Considering only the new-field wildcats, 1951 witnessed an increase of 16.9 per cent in holes drilled and an increase of 26.3 per cent in footage drilled, compared with 1950.

3. In Colorado, Kansas, Louisiana, and Texas, there were significant increases in exploratory drilling in 1951, contrasted with 1950, but there were decreases in Indiana and Oklahoma.

4. The average depth of hole for all exploratory drilling increased from 3,898 ft. in 1950 to 4,197 ft. in 1951. This year, Mississippi holds the record (7,235 ft.) for average depth of exploratory hole, Louisiana being second with an average depth of 7,161 ft.

F. H. LAHEE

This extensive digest of the report of the chairman of the American Association of Petroleum Geologists' Committee on Exploratory Statistics, presented at the association's annual meeting in Los Angeles, March 24-27, is published by special permission of the author and the A.A.P.G. The full report will be published in the June bulletin of the A.A.P.G.

IN the states covered in this review, as shown in Fig. 1 and listed in Table 2, during 1951 a total of 49,343,694 ft. was drilled in 11,756 exploratory holes, divided as follows:

2,217 producers	10,621,065 ft.
9,539 dry holes	38,722,629 ft.

This means that 18.86 per cent of the holes drilled, and 21.52 per cent of the footage drilled, were successful in 1951. One producer foot was drilled for every 4.64 ft. of dry hole. One successful well was drilled for every 4.30 dry holes. The average depth of hole was 4,197 ft. (Attention is called to the average depth figures for the various producing classes and for dry holes, and totals, at the bottom of the footage columns in Table 2).

Bases for drilling.—In Table 3 are listed the reasons for drilling the new-field wildcats in 1951, by using the best information available from men familiar with such statistics, each in his own state or district. According to these figures 605 new-field wildcats drilled on technical advice (geology and/or geophysics) were

*Geological and research counselor of Sun Oil Co., Dallas.

Fig. 2—Details on exploratory drilling for Texas, Southeast New Mexico, Louisiana, and Arkansas.

successful, and 4,478 were dry; 16 holes, located for nontechnical reasons, were producers, and 375 were dry; 63 producers and 652 dry holes were located for reasons unknown. These figures show that 11.9 per cent of the holes drilled on technical advice were producers as contrasted to 4.1 per cent successful in the case of holes located without technical advice. Therefore, in 1951, locations for new-field wildcats based on technical recommendations were 2.9 times as successful as those drilled without such advice. Seismographic methods

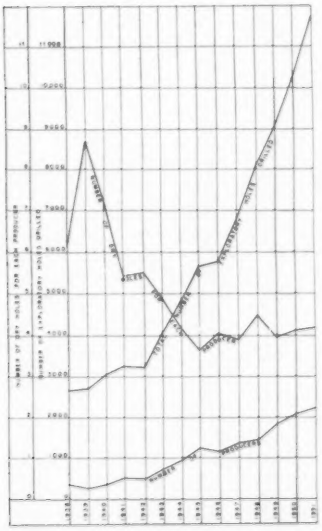


Fig. 3—Relative success of exploratory drilling in the United States from 1938 to 1951, inclusive.

marizes the statistics on the basis for locating new-field wildcats in the United States for each of the years 1944 to 1951, inclusive.

Notes on Tables

Table 5 presents data on the footage drilled in new-field wildcats in the years 1944 to 1951, inclusive.

Table 6 gives a breakdown, by classes, of the exploratory holes drilled in 1951 in the United States. Each class is shown separately, both producers and dry holes, and the three types of new-pool tests are grouped together in column 5.

In Table 7 is shown a percentage analysis of the exploratory drilling in 1951 and also in 1949 and 1550. In 1951, the percentage of new-field wildcatting in the entire exploratory drilling program was just over 52 per cent. That for new-pool testing was 26 per cent, and that for outpost drilling was just over 21 per cent. In Table 8 are listed comparative data from 1938 to 1951, inclusive.

Table 9 shows the relative success,

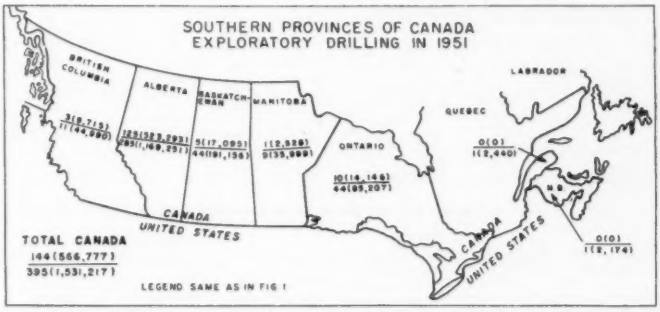


Fig. 4—Dry holes and producing wells resulting from exploratory drilling in 1951 in Canada.

were largely responsible for 294 producers and 1,613 dry holes, among the new-field wildcats. Table 4 sum- as measured by the number of producers in comparison with the number of dry holes, in each year from

TABLE 1—CLASSIFICATION OF EXPLORATORY WELLS

			I. *Classification When Drilling Is Started*	II. *Classification After Completion or Abandonment*	
				Successful	*Unsuccessful*
			A	*B*	*C*
Drilling for extension of partly developed pool			1 Outpost (Extension test)	1 Extension well (Sometimes a new-pool discovery well)	1 Dry outpost (Dry extension test)
Drilling for a *new pool* on a structure or in a geological environment already productive	New-pool tests	Drilling within limits of proved area of pool — For new pool *above* deepest pool	2a Shallower-pool test	2a Shallower-pool discovery well (Sometimes shallower-pool extension well)	2a Dry shallower-pool test
		Drilling within limits of proved area of pool — For new pool *below* deepest pool	2b Deeper-pool test	2b Deeper-pool discovery well (Sometimes deeper-pool extension)	2b Dry deeper-pool test
		Drilling outside limits of proved area of pool	2c New-pool wildcat	2c New pool discovery wildcat (Sometimes an extension well)	2c Dry new-pool wildcat
				New-pool discovery wells (Or sometimes extension wells)	Dry new-pool tests
Drilling for a *new field* (on a structure in an environment never before productive)			3 New-field wildcat	3 New-field discovery wildcat	3 Dry new-field wildcat

TABLE 2—NUMBER OF OIL WELLS, GAS WELLS, CONDENSATE WELLS, AND DRY HOLES DRILLED IN UNITED STATES AS EXPORATORY TESTS IN 1951

State—	Oil producers		Gas producers		Condensate producers		Total producers		Dry holes		Grand total		Average depth of hole*
	No. of holes	Footage	No. of holes	Footage	No. of holes	Footage	No. of holes	Footage	No. of holes	Footage	No. of holes	Footage	
Alabama	2	11,905	0	0	0	0	2	11,905	24	147,581	26	159,486	6,134
Arizona	0	0	0	0	0	0	0	0	5	9,608	5	9,608	
Arkansas	21	71,338	2	5,599	1	7,401	24	84,338	104	385,924	128	470,262	3,674
California	70	324,244	12	53,769	0	0	82	378,013	495	1,984,299	577	2,362,312	4,094
Colorado	12	70,496	8	37,700	0	0	20	108,196	127	650,070	147	758,266	5,158
Florida	0	0	0	0	0	0	0	0	3	21,695	3	21,695	
Idaho	0	0	0	0	0	0	0	0	1	12,844	1	12,844	
Illinois	97	266,546	2	1,255	0	0	99	267,801	795	1,838,586	894	2,106,387	2,356
Indiana	82	196,399	4	5,884	0	0	86	202,283	592	1,074,056	678	1,276,339	1,883
Iowa	0	0	0	0	0	0	0	0	3	6,232	3	6,232	
Kansas	241	805,204	21	95,452	1	5,752	263	906,408	1,082	3,930,428	1,345	4,836,836	3,596
Kentucky	72	136,160	8	20,977	0	0	80	157,137	317	643,002	397	800,139	2,015
Louisiana	122	818,695	18	103,105	34	272,615	174	1,194,415	479	3,481,571	653	4,675,986	7,161
Maryland	0	0	6	23,987	0	0	6	23,987	5	25,092	11	49,079	
Michigan	22	64,657	5	10,166	0	0	27	74,823	326	756,171	353	830,994	2,354
Mississippi	13	106,100	1	6,516	3	19,916	17	132,532	157	1,126,401	174	1,258,933	7,235
Missouri	0	0	0	0	0	0	0	0	1	2,059	1	2,059	
Montana	12	56,074	3	4,298	0	0	15	60,372	78	239,784	93	300,156	3,225
Nebraska	17	85,556	6	22,392	0	0	23	107,948	132	570,084	155	678,032	4,374
Nevada	0	0	0	0	0	0	0	0	5	11,913	5	11,913	
New Mexico	38	292,032	26	101,298	0	0	64	393,330	112	509,020	176	902,350	5,127
New York	0	0	0	0	0	0	0	0	15	26,361	15	26,361	
North Carolina	0	0	0	0	0	0	0	0	4	9,499	4	9,499	
North Dakota	1	11,955	0	0	0	0	1	11,955	10	41,682	11	53,637	
Ohio	4	12,928	30	75,540	0	0	34	88,468	64	164,277	98	252,745	2,579
Oklahoma	169	655,571	18	80,907	2	25,994	189	762,472	712	2,850,558	901	3,613,030	4,010
Oregon	0	0	0	0	0	0	0	0	3	13,216	3	13,216	
Pennsylvania	1	2,298	9	39,040	0	0	10	41,338	32	152,149	42	193,487	4,607
South Carolina	0	0	0	0	0	0	0	0	1	995	1	995	
South Dakota	0	0	0	0	0	0	0	0	6	22,657	6	22,657	
Tennessee	3	3,707	0	0	0	0	3	3,707	13	23,494	16	27,201	
Texas	719	3,837,145	117	579,220	85	772,510	921	5,188,875	3,628	16,982,942	4,549	22,171,817	4,852
Utah	5	30,350	1	4,761	0	0	6	35,111	25	124,671	31	159,782	5,154
Virginia	0	0	12	54,517	0	0	12	54,517	13	64,005	25	118,522	4,741
Washington	0	0	0	0	0	0	0	0	1	3,711	1	3,711	
West Virginia	0	0	17	61,073	0	0	17	61,073	11	47,291	28	108,364	3,870
Wyoming	40	266,113	2	3,948	0	0	42	270,061	158	768,701	200	1,038,762	5,194
Total	1,763	8,125,473	328	1,391,404	126	1,104,188	2,217	10,621,065	9,539	38,722,629	11,756	49,343,694	4,197
Average depth per hole		4,609		4,242		8,763		4,791		4,059		4,197	

*Average per well footage given only where 25 or more wells were drilled in a state.

TABLE 3—BASIS FOR LOCATING NEW-FIELD WILDCATS DRILLED IN 1951

State—	Geology		Geophysics*		Geology and geophysics		Sundry non-technical		Unknown		Total		Grand total
	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	
Alabama	0	9	0	9	0	1	0	1	0	0	0	20	20
Arizona	0	4	0	0	0	0	0	0	0	1	0	5	5
Arkansas	3	61	1	8	1	11	0	0	1	4	6	84	90
California	6	187	1	13	2	51	0	61	0	11	9	323	332
Colorado	2	32	14	63	1	9	1	5	0	14	18	123	141
Florida	0	1	0	1	0	0	0	1	0	0	0	3	3
Idaho	0	1	0	0	0	0	0	0	0	0	0	1	1
Illinois	35	250	2	16	4	13	0	35	0	0	41	314	355
Indiana	29	373	2	32	0	0	0	0	2	53	33	458	491
Iowa	0	0	0	0	0	0	0	0	0	3	0	3	3
Kansas	12	154	7	58	4	12	0	0	8	136	31	360	391
Kentucky	10	127	0	2	0	0	1	23	0	12	11	164	175
Louisiana	10	109	20	109	11	95	0	0	0	1	41	314	355
Maryland	0	1	0	0	0	0	0	0	0	0	0	1	1
Michigan	15	216	0	0	0	0	0	3	0	2	15	221	236
Mississippi	8	87	4	56	4	11	0	1	0	0	16	155	171
Missouri	0	0	0	0	0	0	0	0	0	1	0	1	1
Montana	1	31	2	8	2	12	0	10	0	2	5	63	68
Nebraska	13	9	0	38	0	1	1	24	0	35	14	107	121
Nevada	0	2	0	0	0	0	0	3	0	0	0	5	5
New Mexico	23	43	9	17	0	1	0	1	1	29	33	91	124
New York	0	0	0	0	0	0	0	11	0	2	0	13	13
North Carolina	0	0	0	0	0	0	0	0	0	4	0	4	4
North Dakota	0	2	0	1	1	5	0	2	0	0	1	10	11
Ohio	1	3	0	0	0	0	2	10	1	1	4	14	18
Oklahoma	36	244	26	92	1	7	2	11	1	4	66	358	424
Oregon	0	2	0	1	0	0	0	0	0	0	0	3	3
Pennsylvania	1	1	0	0	0	2	1	6	1	7	3	16	19
South Carolina	0	0	0	0	0	0	0	0	0	1	0	1	1
South Dakota	0	3	0	1	0	0	0	0	0	2	0	6	6
Tennessee	0	5	0	1	0	0	0	0	0	2	0	8	8
Texas	112	893	102	441	48	310	6	155	48	325	316	2,124	2,440
Utah	1	20	2	4	0	0	0	0	0	0	3	24	27
Virginia	2	6	0	0	0	0	0	0	0	0	2	6	8
Washington	0	0	0	1	0	0	0	0	0	0	0	1	1
West Virginia	3	2	0	0	0	0	2	0	0	0	5	2	7
Wyoming	1	54	3	18	7	15	0	12	0	0	11	99	110
Total	324	2,932	195	990	86	556	16	375	63	652	684	5,505	6,189

*Includes five dry holes located by geochemistry.

TABLE 4—BASIS FOR LOCATING NEW-WELL WILDCATS
(For all states reported in United States)

	Geology		Geophysics*		Geology and geophysics		Total technical		Nontechnical		Unknown		Total		
	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Grand total
1944	148	1,328	108	589	40	177	296	2,094	38	570	8	88	342	2,752	3,094
1945	180	1,488	89	468	53	220	322	2,176	17	302	13	207	352	2,685	3,037
1946	154	1,584	91	413	57	211	302	2,208	10	363	21	†229	333	†2,800	†3,133
1947	200	1,691	100	514	63	295	364	2,500	15	389	15	197	394	3,086	3,480
1948	232	2,039	124	595	99	400	455	3,034	12	372	34	389	501	3,795	4,296
1949	222	2,133	180	650	62	360	464	3,143	11	367	30	433	506	3,943	4,449
1950	279	2,523	173	739	81	403	528	3,665	19	526	40	507	592	4,698	5,290
1951	324	2,932	195	990	86	556	605	4,478	16	375	63	652	684	5,505	6,189

*Includes a few holes based on geochemistry. †See note referring to North Carolina exploratory drilling, Bull. A.A.P.G., Vol. 33, p. 1903. Correction has been made in the table above.

TABLE 5—FOOTAGE DRILLED IN NEW-FIELD WILDCATS
(For all states reported in United States)

	No. of producers	No. of dry holes	Total producers and dry holes	Total feet drilled in producers	Total feet drilled in dry holes	Total feet drilled in all new-field wildcats	Average depth of new-field wildcats
1944	342	2,752	3,094	1,640,473	11,356,749	12,997,222	4,200
1945	352	2,685	3,037	1,789,392	11,579,385	13,368,777	4,402
1946*	333	2,800	3,133	1,692,977	10,862,145	12,555,122	4,007
1947	394	3,086	3,480	2,696,864	12,520,723	14,617,587	4,200
1948	501	3,795	4,296	2,690,951	16,049,313	18,740,264	4,362
1949	506	2,943	4,449	2,786,774	15,372,983	18,159,757	4,082
1950	592	4,698	5,290	3,146,090	18,972,164	22,118,254	4,177
1951	684	5,505	6,189	3,831,263	24,116,951	27,948,214	4,516

*See note referring to North Carolina exploratory drilling, Bull. A.A.P.G., Vol. 33, p. 1903. Correction has been made in the table above.

1944 to 1951, inclusive. The same data for all exploratory holes are graphically shown from 1938 to 1951 in Fig. 3.

Class distribution.—As indicated in Table 1, a hole may be located as an outpost with the intention of trying to extend a pool partly developed, but instead it may discover a new pool; and, similarly, a new-pool wildcat may be located in search of a new pool because it is believed to be well outside the limits of the known pool, but instead it may result in extending this known pool farther than had been expected. A majority of outposts, if successful, are completed as extension wells and a majority of new-pool wildcats, if successful, discover new pools. To show the class distribution of these completions in 1951, we prepared Table 10. Here we see that 477 outposts were completed as extension wells and 218 were completed as new-pool discoveries; and 339 new-pool wildcats discovered new pools whereas 179 new-pool wildcats were completed as extension wells.*

Wildcatting by Company Size

A question sometimes asked concerns the approximate percentage of

*The new-pool discoveries referred to in this paper are all the result of exploratory drilling. In addition to these, at least 80 new pools were discovered in the drilling of field-development wells. These included 54 discoveries of oil, 5 of gas, and 21 of condensate.

TABLE 6—NUMBER OF EXPLORATORY HOLES DRILLED IN UNITED STATES IN 1951, BY CLASSES AND STATES

	1		2		3		4		5		6		7		8
	Outposts		New-pool wildcats		Deeper-pool tests		Shallower-pool tests		Total new-pool tests (2+3+4)		New-field wildcats		Total exploratory holes Total (1+5+6)		
State—	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Producers	Dry holes	Grand total
Alabama	2	2	0	0	0	2	0	0	0	2	0	20	2	24	26
Arizona	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
Arkansas	4	9	7	5	5	6	2	0	14	11	6	84	24	104	128
California	44	65	21	92	7	15	1	0	29	107	9	323	82	495	577
Colorado	0	2	1	1	1	1	0	0	2	2	18	123	20	127	147
Florida	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Idaho	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Illinois	47	374	0	57	2	48	9	2	11	107	41	314	99	795	894
Indiana	33	96	20	35	0	3	0	0	20	38	33	458	86	592	678
Iowa	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Kansas	75	245	95	476	15	1	47	0	157	477	31	360	263	1,082	1,345
Kentucky	33	43	33	105	2	5	1	0	36	110	11	164	80	317	397
Louisiana	24	65	43	78	81	20	15	2	109	100	41	314	174	479	653
Maryland	6	4	0	0	0	0	0	0	0	0	0	1	6	5	11
Michigan	8	69	0	31	3	4	1	1	4	36	15	221	27	326	353
Mississippi	0	1	0	0	1	1	0	0	1	1	16	155	17	157	174
Missouri	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Montana	6	9	3	2	1	4	0	0	4	6	5	63	15	78	93
Nebraska	6	13	2	12	0	0	1	0	3	12	14	107	23	132	155
Nevada	0	0	0	0	0	0	0	0	0	0	0	5	0	5	5
New Mexico	20	10	4	0	3	9	4	2	11	11	33	91	64	112	176
New York	0	0	0	2	0	0	0	0	0	2	0	13	0	15	15
North Carolina	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4
North Dakota	0	0	0	0	0	0	0	0	0	0	1	10	1	10	11
Ohio	10	20	12	22	2	2	6	6	20	30	4	14	34	64	98
Oklahoma	50	78	34	271	26	5	13	0	73	276	66	358	189	712	901
Oregon	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
Pennsylvania	7	6	0	8	0	2	0	0	0	10	3	16	10	32	42
South Carolina	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
South Dakota	0	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Tennessee	3	4	0	1	0	0	0	0	0	1	0	8	3	13	16
Texas	263	661	235	714	55	107	52	22	342	843	316	2,124	921	3,628	4,549
Utah	3	0	0	0	0	1	0	0	0	1	3	24	6	25	31
Virginia	6	3	4	4	0	0	0	0	4	4	2	6	12	13	25
Washington	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
West Virginia	12	5	0	3	0	1	0	0	0	4	5	2	17	11	28
Wyoming	20	39	4	12	1	8	6	0	11	20	11	99	42	158	200
Total U. S.	682	1,823	518	1,931	175	245	158	35	851	2,211	684	5,505	2,217	9,539	11,756

true wildcatting (new-field wildcatting) by major companies, on the one hand, and by minor companies and independents, on the other hand. Distinction between these three classes of operator is not always easy, and in some instances the same company may be regarded as a "major" in one district, but as a "minor" in another district.

In order to standardize the use of these terms in connection with these exploratory statistics, the committee has drawn up the following definitions, and in the present annual report it is adhering to them:

Definitions for Use in Statistical Compilations of the Committee on Statistics of Exploratory Drilling of the A.A.P.G.

A. An "independent" is an individual, syndicate, family, or company, without regard to financial size, which does not have stock available to the public through sale on any exchange, or curb, or "over the counter."

B. Both "majors" and "minors" are companies or corporations which have stock held by the public and offered for sale or purchase on some stock exchange, or curb exchange, or over the counter.

As criteria for discriminating between majors and minors, we have the following:

1. A major company should be integrated with respect to at least three of the four

TABLE 7—PERCENTAGE OF EXPLORATORY HOLES DRILLED IN EACH CLASS IN THE UNITED STATES IN 1949, 1950, AND 1951

	1949			1950			1951		
	Number	Well per cent	Class per cent	Number	Well per cent	Class per cent	Number	Well per cent	Class per cent
Outposts:									
Producers	668	31.04	....	780	30.94	....	680	27.16	....
Dry holes	1,484	68.96	....	1,741	69.06	....	1,823	72.84	....
Total	2,152	100.00	23.76	2,521	100.00	24.46	2,503	100.00	21.29
New-pool wildcats:									
Producers	469	25.11	....	418	20.13	....	518	21.15	....
Dry holes	1,399	74.89	....	1,609	79.87	....	1,931	78.85	....
Total	1,868	100.00	20.62	2,027	100.00	19.67	2,449	100.00	20.83
Deeper-pool tests:									
Producers	130	25.89	....	107	32.42	....	175	41.66	....
Dry holes	372	74.11	....	223	67.58	....	245	58.34	....
Total	502	100.00	5.54	330	100.00	3.20	420	100.00	3.58
Shallower-pool tests:									
Producers	57	65.52	....	117	84.76	....	158	81.87	....
Dry holes	30	34.48	....	21	15.24	....	35	18.13	....
Total	87	100.00	.96	138	100.00	1.34	193	100.00	1.64
New-field wildcats:									
Producers	506	11.37	....	592	11.19	....	684	11.05	....
Dry holes	3,943	88.63	....	4,698	88.81	....	5,505	88.95	....
Total	4,449	100.00	49.13	5,290	100.00	51.33	6,189	100.00	52.86
Total producers	1,830	20.20		2,014	19.54		2,217	18.86	
Total dry holes	7,228	79.80		8,292	80.46		9,539	81.14	
Grand total	9,058	100.00	100.00	10,306	100.00	100.00	11,756	100.00	100.00

TABLE 8—STATISTICS ON EXPLORATORY HOLES AND FOOTAGE DRILLED, AND ON AVERAGE DEPTH OF EXPLORATORY HOLE IN UNITED STATES

	A		B	C	D	E	F	G	H	I	J	K
	Successful exploratory wells											
Year	Total producers*		New-field disc. wells	B is what per cent of A	No. of dry exploratory holes	Total exploratory holes (A+D)	No. of dry exploratory holes drilled for each producer (D/A)	Total footage in successful exploratory holes	Total footage in dry exploratory holes	No. of feet drilled in dry holes for each foot in producers (H/G)	Total exploratory footage (G+H)	Average depth of exploratory holes (J/E)
1938	294 oil 75 gas	369	226	61.2	2,269	2,638	6.14	1,526,557	7,333,927	4.84	8,860,484	3,359
1939†	226 oil 49 gas	275	175	63.6	2,427	2,702	8.81	1,118,420	7,674,677	6.86	8,793,097	3,331
1940	302 oil 64 gas	366	241	65.8	2,672	3,038	7.30	1,411,550	8,842,418	6.26	10,253,048	3,375
1941	416 oil 60 gas 27 cond.	503	282	56.1	2,761	3,264	5.48	2,047,377	9,567,708	4.66	11,615,085	3,559
1942	410 oil 53 gas 29 cond.	492	268	54.5	2,720	3,212	5.52	2,158,707	9,965,287	4.62	12,123,994	3,775
1943‡	530 oil 147 gas 37 cond.	714	400	56.0	3,294	4,008	4.61	2,936,266	12,783,447	4.35	15,719,713	3,922
1944	709 oil 149 gas 86 cond.	944	342	36.2	3,852	4,796	4.08	4,382,220	15,843,667	3.61	20,225,887	4,217
1945	840 oil 274 gas 100 cond.	1,214	352	29.0	4,399	5,613	3.62	5,501,702	17,528,564	3.19	23,030,266	4,103
1946§	762 oil 272 gas 103 cond.	1,137	333	29.3	4,622	5,759	4.06	5,286,711	16,911,032	3.18	22,197,743	3,854
1947	981 oil 325 gas 72 cond.	1,378	394	28.6	5,397	6,775	3.90	6,166,163	20,227,185	3.28	26,393,348	3,896
1948	1,098 oil 255 gas 110 cond.	1,463	501	34.2	6,550	8,013	4.48	7,179,450	25,561,647	3.56	32,741,097	4,086
1949	1,406 oil 285 gas 139 cond.	1,830	506	27.6	7,228	9,058	3.95	8,359,690	26,438,601	3.16	34,798,291	3,842
1950	1,583 oil 299 gas 132 cond.	2,014	592	29.4	8,292	10,306	4.11	9,217,779	30,957,394	4.35	40,175,173	3,898
1951	1,763 oil 328 gas 126 cond.	2,217	684	30.85	9,539	11,756	4.30	10,621,065	38,722,629	3.65	49,343,694	4,197

*In the years 1938 to 1940, inclusive, condensate-plus-gas wells are included with gas wells. After 1940 gas wells and condensate-plus-gas wells are listed separately in this table. †Kentucky statistics were added for 1939 after publication of that year's report. ‡Statistics for New York, Pennsylvania, and eastern Ohio have been included here in 1943, although they came in too late for publication in the 1943 report. §Six dry new-field wildcats, with a total of 30,182 ft., drilled in North Carolina and omitted by mistake in the 1946 report, were added here in Table 8 in the 1949 report.

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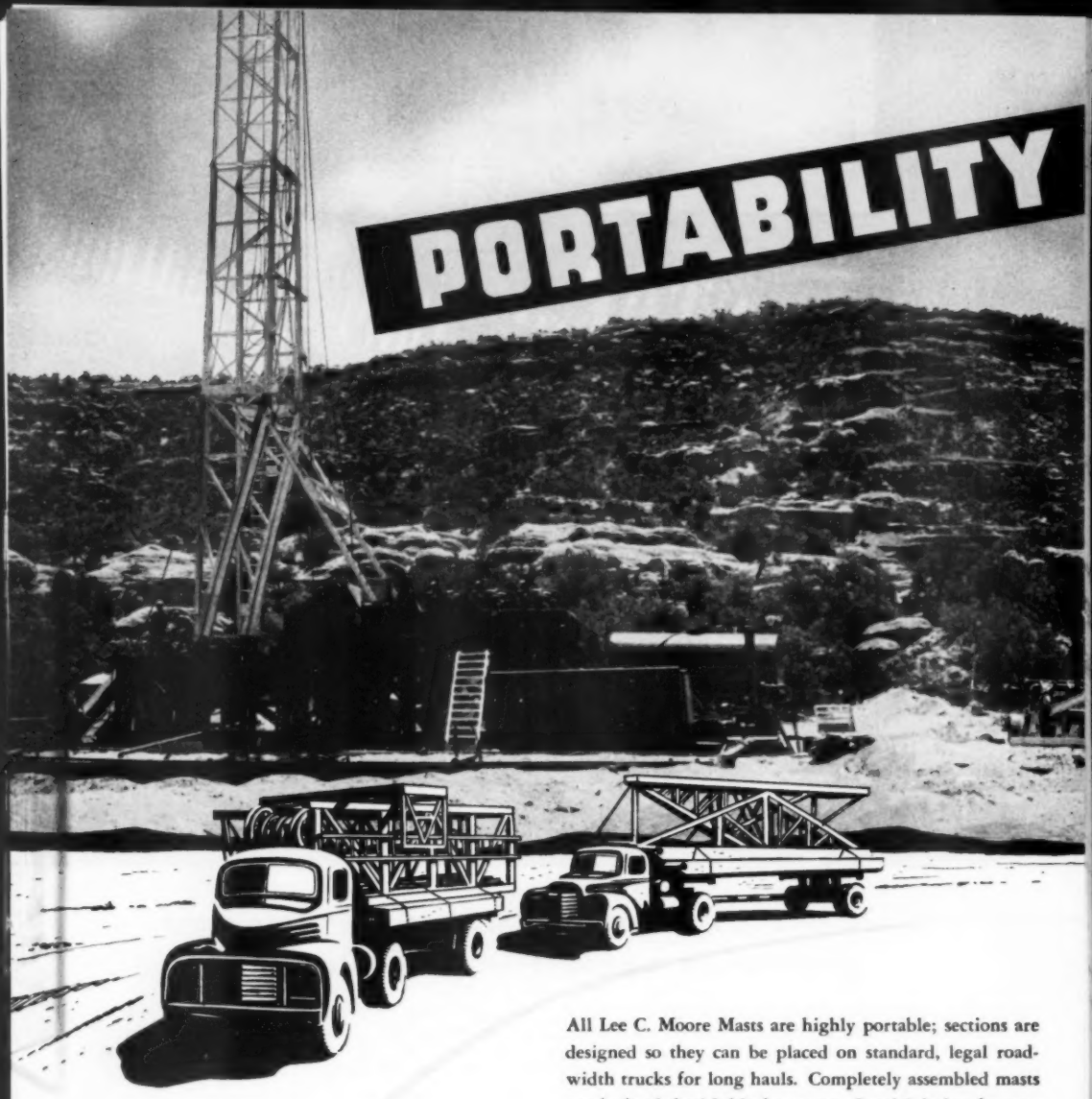

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main activities of the petroleum industry, namely, production, transportation, refining, and retail marketing. In any case, one of these activities must be production.

2. A major company should operate (lease, drill, and produce) in two or more states, or in two or more major divisions of a state (such as the divisions in California, Texas, and Louisiana).

3. A major company should have its current assets equal to, or greater than, a certain arbitrarily designated level. For purposes of the committee on statistics of exploratory drilling, this level is set at 20 million dollars.

All companies under "B," which do not sufficiently fulfill requirements 1, 2, and 3, are classed as "minor."

(N.B.: Under certain rare exceptions a company may be classified as major even if it does not fully comply with all of these criteria (1 to 3). For instance, a company which has over 20 million dollars as current assets and is active in producing in several states, may still be called major even if it is not an integrated company (see 1).

C. In classifying subsidiaries,

1. A subsidiary of any company is classified as major if it (the subsidiary) fulfills all the requirements under B1, 2, and 3.

2. If the parent company of a subsidiary meets the reqquirements under B1, 2 and 3, and provided this subsidiary is more than 50 per cent owned by its parent company, the subsidiary also is to be classed as major, even though, in its own current assets and field of operations, it may not comply with B1, 2 and/or 3.

3. A company which is engaged in the petroleum industry, but which is a subsidiary of a parent company engaged in some other business (chemicals, sulfur pro-

(Continued on page 124)

TABLE 9—RELATIVE SUCCESS OF EXPLORATORY DRILLING IN UNITED STATES FROM 1944 TO 1951, INCLUSIVE

	New-field wildcats		All exploratory holes	
Year	No. of dry holes for each producer	Percentage of wells successful	No. of dry holes for each producer	Percentage of wells successful
1944	8.05	11.05	4.08	19.67
1945	7.63	11.59	3.62	21.64
1946	8.39	10.65	4.06	19.76
1947	7.80	11.32	3.90	20.34
1948	7.57	11.66	4.50	18.25
1949	7.79	11.37	3.95	20.20
1950	7.93	11.19	4.11	19.54
1951	8.05	11.05	4.30	18.86
1944-1951, inc.	7.63	11.59	4.09	19.65

TABLE 11—FIELDS* DISCOVERED IN 1945, 1948, AND 1951, GROUPED ACCORDING TO THEIR TOTAL ULTIMATE RESERVES AS ESTIMATED ON JANUARY 1, 1952

	Number of fields discovered in year indicated by reserve groups†								
Year	A	B	C	D	E	F	Total A—F inclusive	A + B + C fields	Percentage of A + B + C fields in total fields
1945	3	1	13	52	150	33	254	19	7.48
1948	2	3	9	65	292	38	409	14	3.42
1951	1	0	8	58	495	8	570	9	1.58

*This table refers only to the states of Alabama, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Montana, Nebraska, New Mexico, Oklahoma, Texas, and Wyoming. It does not include gas fields unless natural-gas liquids are produced, and then the reserves figure relates only to these liquids. A few fields were omitted because of inadequate estimates, and a few producing areas, at first thought to be new fields, have become consolidated with other fields.

†In this table, A means 50 million barrels or more, B means between 25 and 50 million barrels, C means between 10 and 25 million barrels, D means between 1 and 10 million barrels, E means less than 1 million barrels, F means abandoned.

TABLE 13—BASIS FOR LOCATION OF NEW-FIELD WILDCATS DRILLED IN 1951 IN CANADA

A. Western Canada

	Geology	Geophysics	Geology plus geophysics	Total technical	Non-technical	Unknown	Total
Producers	23	32	11	66	5	4	75
Dry holes	55	153	56	264	29	10	303
Total	78	185	67	330	34	14	378

B. Eastern Canada

Producers	0	0	0	0	0	1	1
Dry holes	3	1	0	4	0	7	11
Total	3	1	0	4	0	8	12

TABLE 10—NEW-POOL DISCOVERIES AND EXTENSIONS OF OLDER POOLS IN UNITED STATES IN 1951

	New pools discovered in 1951					Extensions of old pools in 1951				
	By outposts	By new-pool wildcats	By deeper-pool tests	By shallower-pool tests	Total new pools discovered in 1951	By outposts	By new-pool wildcats	By deeper-pool tests	By shallower-pool tests	Total extensions in 1951
Oil	167	278	134	124	723	359	164	8	7	538
Gas	20	44	18	19	101	100	13	0	5	118
Condensate	11	17	14	2	44	18	2	1	1	22
Total	218	339	166	145	868	477	179	9	13	678

*This table does not include discoveries of new fields.

TABLE 12—EXPLORATORY DRILLING IN CANADA IN 1951

	Oil		Gas		Condensate		Total prod.		Dry		Grand total	
Province and well classification—	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage	No.	Footage
Alberta:												
Outposts	14	64,985	15	47,111	1	12,177	30	124,273	34	13,722	64	137,995
New-pool wildcats	12	50,904	7	25,399	0	0	19	76,393	15	63,193	34	139,586
Deeper-pool tests	1	171	1	318	0	0	2	489	2	6,884	4	7,373
Shallower-pool tests	2	9,246	1	1,158	0	0	3	10,404	0	0	3	10,404
New-field wildcats	23	136,307	46	156,750	2	18,677	71	311,734	234	1,085,452	305	1,397,186
Total	52	261,703	70	230,736	3	30,854	125	523,293	285	1,169,251	410	1,692,544
British Columbia:												
New-field wildcats	0	0	3	9,715	0	0	3	9,715	11	44,990	14	54,705
Gaspe:												
New-field wildcats	0	0	0	0	0	0	0	0	1	2,440	1	2,440
Manitoba:												
New-field wildcats	1	2,528	0	0	0	0	1	2,528	9	35,999	10	38,527
New Brunswick:												
New-field wildcats	0	0	0	0	0	0	0	0	1	2,174	1	2,174
Ontario:												
Outposts	0	0	0	0	0	0	0	0	2	1,593	2	1,593
New-pool wildcats	1	452	6	13,048	0	0	7	13,500	33	70,437	40	83,937
Deeper-pool tests	0	0	2	240	0	0	2	240	0	0	2	240
New-field wildcats	1	406	0	0	0	0	1	406	9	13,177	10	13,583
Total	2	858	8	13,288	0	0	10	14,146	44	85,207	54	99,353
Saskatchewan:												
New-field wildcats	3	11,439	2	5,656	0	0	5	17,095	44	191,156	49	208,251
Total:												
Outposts	14	64,985	15	47,111	1	12,177	30	124,273	36	15,315	66	139,588
New-pool wildcats	13	51,446	13	38,447	0	0	26	89,893	48	133,630	74	223,523
Deeper-pool tests	1	171	3	558	0	0	4	729	2	6,884	6	7,613
Shallower-pool tests	2	9,246	1	1,158	0	0	3	10,404	0	0	3	10,404
New-field wildcats	28	150,680	51	172,121	2	18,677	81	341,478	309	1,375,388	390	1,716,866
Grand total	58	276,528	83	259,395	3	30,854	144	566,777	395	1,531,217	539	2,097,994

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REED

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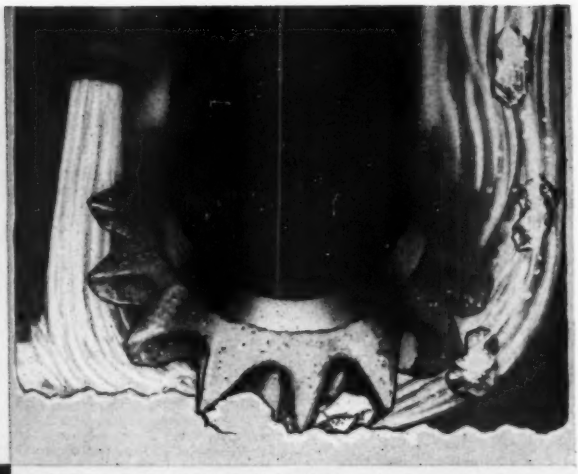
ROCK BIT



This REED Twin-Blast Slush Nozzle is the heart of this great new series of bits.

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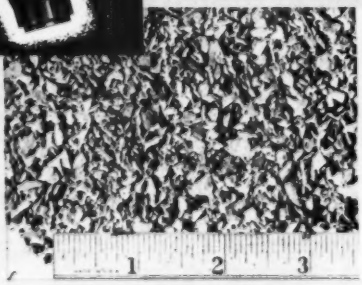

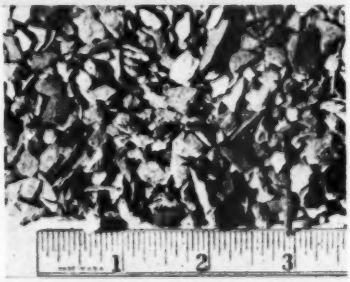

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Both sets of these cuttings were taken in the same formation, under similar conditions. Those taken with a conventional bit are small, indicating that re-cutting had taken place. Cuttings made with the Twin-Blast Bit were blasted up into the mud stream before re-cutting could take place. The Twin-Blast Bit drilled faster and gave more hole in this formation.

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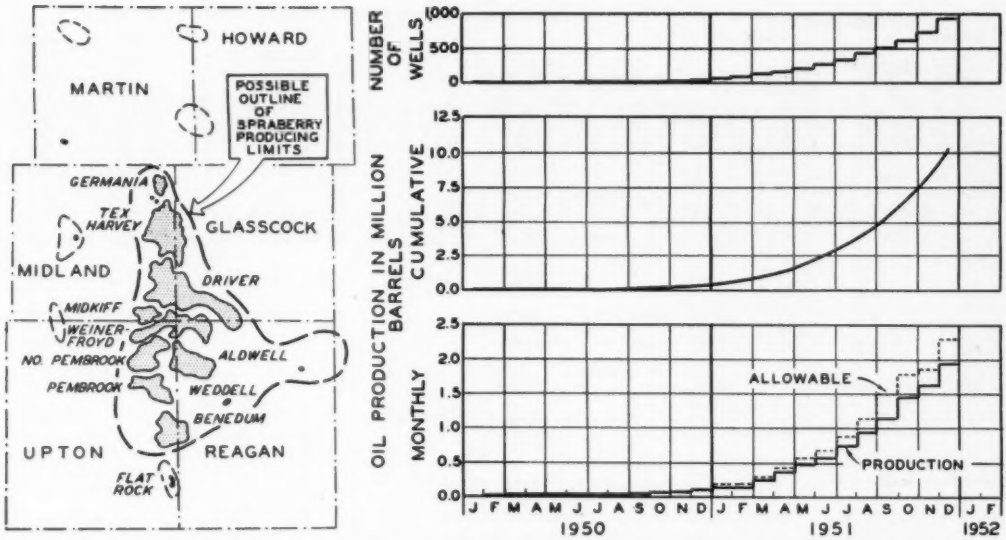

Map of Spraberry trend in West Texas, and graph showing monthly allowable, actual production by months, number of wells, and cumulative production.

Production Performance in Spraberry

by R. S. Christie* and J. C. Blackwood*

THE technique of interpreting Spraberry core analyses has improved greatly with experience in the past few months. Early interpretations indicated that a large part of the upper and lower zones, and even the middle zone in some cases, contained producible oil. Ogden and Locke[1] recently have discussed Spraberry core-analysis techniques in detail.

1. Quotation from Ogden and Locke: "The controlling influence in the physical properties of the shaly sand is the shale content which may vary, in degree of lamination, from 5 to 50 per cent. Most of the analyses to date have been performed by the conventional retort type of anayisis, rather than by whole-core analyses. This is because, where the fracture porosity would be of value, the fractures are broken open by the coring process and any reconstruction work would have an indefinite accuracy inasmuch as the core fragments would have to be bound together by tape or wire. Consequently, most of the core analyses have been performed to evaluate the matrix. The matrix analyses have been complicated by the presence of a material in the shale laminations that is either kerogen or a solid hydrocarbon. This material will not fluoresce under ultraviolet light and will not cut with carbon tetrachloride at normal temperatures; however, at a heat above 700° F. it becomes oil. Vacuum distillation at 450° F. will not remove this substance. Whether this substance is kerogen or a solid hydrocarbon is something that is still not definitely determined. However, we feel that it will not move through the pores of the formation and therefore does not constitute part of the true reservoir of the Spraberry formation."

SPRABERRY AREA PRODUCTION DATA BY FIELDS

Field—	Wells	Dec. 1951 prod. (bbl.)	Cum. prod. end 1951 (bbl.)
Aldwell	12	18,164	43,906
Benedum	46	96,907	343,214
Driver	162	392,351	1,266,309
Flat Rock	3	5,005	20,879
Germania	53	91,236	786,940
Midkiff	32	71,005	268,964
N. Pembrook	82	166,984	473,401
Pembrook	83	149,435	781,365
Tex-Harvey	394	801,598	5,914,455
Weddell	12	13,343	44,504
Weiner-Floyd	62	117,424	411,862
Total	941	1,923,452	10,355,799

Having determined that the oil saturation in the nonproductive zone is not movable oil and therefore not actually residual oil, laboratory technicians are now designating zones capable of producing oil, as "effective" or "productive porosity."

Fig. 1 is a typical completion core graph in the Spraberry trend region. Productive porosity has been plotted on the left side of the graph. Productive porosity may be defined as the porosity, in rock-volume per cent that was occupied by movable fluid in the formation. Using the residual-oil saturations and connate-water saturations, the productive zones can be interpreted to be either oil or water productive.

Core-analysis data will give a reasonable estimate of oil in place but do not give a reliable indication of the productive capacity of a well nor a comparison of the productivity of any two zones. The fracture system is the criterion for evaluating the potential of a well. This is shown by a well located in an area where tests in the lower zone have resulted in poor wells and therefore nearly all wells have been completed in the upper zone only. This particular well, based on core analyses, had zero pay in the upper zone and 21 ft. of pay in the lower zone. Both zones were left open and both zones Hydrafraced. A test after Hydrafrac treatment of the lower zone swabbed oil at the rate of 90 bbl. per day. After Hydrafrac treatment of the upper zone the well flowed 270 bbl. per day.

Specific Core-Analysis Information

Cores from a considerable number of wells have been analyzed but the area is so large that many more must be analyzed to give accurate rock properties for the fields or for the group of fields. However, the information available is believed to be

*Amerada Petroleum Corp., Tulsa. Paper presented at Southwestern District meeting, A.P.I. Division of Production, Shreveport, La., March 5-7, 1952.

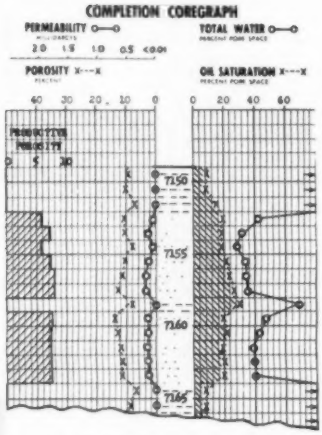

Fig. 1—Completion core graph for a Spraberry well.

fairly representative of the general characteristics of the Spraberry pay horizons and allow qualitative comparisons between areas.

Table 1 contains core-analysis data taken from cores obtained from 8 of the 11 fields here considered. The information includes data from both the upper and lower Spraberry. For the upper zone 33 wells, with an average effective pay section of 21 ft., had a weighted average porosity of 12.5 per cent; a weighted average permeability of 0.441 md.; and a weighted average connate-water percentage of 32.7. Eleven wells in the lower zone with an average effective pay of 16 ft. indicated the following weighted averages: porosity 12.7 per cent, permeability 0.163 md., and connate water 26.5 per cent. These values were obtained on the matrix only, no attempt being made to evaluate the fractures.

Most of the oil in the reservoir is in the matrix rock, with a minor percentage, perhaps in the order of 1 or 2 per cent, in the fractures. It has been determined by flow rates and measurement of cores that the average fracture width in the productive horizons are in the order of 0.005 to 0.01 cm. Various methods of stimulation, such as Hydrafrac, open up existing fractures and create new ones to permit a greater flow into the well bore. These fractures are important in making production of oil possible from the otherwise almost impermeable Spraberry sands.

The numerous fractures form channels through which the oil may migrate over considerable distances into a bore hole. The efficiency of the flow is greatly increased where these fractures converge or cross each other. As the oil is produced from these fractures, the pressure is reduced which undoubtedly causes them to be recharged by a migration of the oil from the matrix.

TABLE 1—SPRABERRY CORE-ANALYSIS DATA, BY FIELDS

Field—	Zone	Wells used	Effective pay (ft.)	Porosity (per cent)	Permeability (md.)	Connate water (per cent)
Tex-Harvey	Upper	4	21	11.2	0.185	37.5
	Lower	2	18	9.8	0.075	37.5
Germania	Upper	2	13	10.8	0.270	35.2
Driver	Upper	16	19	12.6	0.550	32.0
	Lower	3	19	11.7	0.200	25.3
Midkiff	Upper	2	23	13.8	0.120	27.0
	Lower	1	11	14.7	0.050	21.2
Weiner-Floyd	Upper	2	25	10.9	0.085	42.0
N. Pembrook	Upper	3	22	12.8	0.180	39.0
	Lower	1	14	15.0	0.700	19.0
Pembrook	Upper	4	25	13.8	0.880	23.0
Benedum	Lower	4	14	13.7	0.074	22.5
Weighted avg.	Upper	33	21	12.5	0.441	32.7
	Lower	11	16	12.7	0.163	26.5

Reservoir Fluid Characteristics

Several bottom-hole samples of reservoir fluids have been analyzed and there is generally good agreement of the results even though only a few of them were taken at or near original reservoir pressure. Data from a few of the samples are shown in Table 2, all of which were from wells completed in the upper zone. The reservoir temperature is approximately 138° F. The oil apparently was undersaturated with a saturation pressure of about 1,900 psig. and a dissolved gas-oil ratio of about 730 cu. ft. per barrel.

The formation volume factor is 1.4 bbl. of reservoir oil at the saturation pressure per barrel of stock-tank oil. The oil and gas are sweet and the

The Spraberry Trend in Summary . . .

1. SIZE.—The Spraberry trend area may ultimately include over 1 million productive acres. With approximately 1,000 wells completed the development is just beginning. The present well spacing is one well to 40 acres but economics will dictate the final well density.

2. FRACTURES.—In producing zones of the Spraberry it is generally conceded the fractures serve as the principal flow channels while the matrix contains the principal oil-storage volume. The character of the rock makes it difficult to arrive at reliable estimates of the producible oil.

3. CRUDE OIL.—Crude was undersaturated at original conditions, the saturation pressure being approximately 1,900 psi. which is 400 to 500 psi. below the original reservoir pressure.

4. PRESSURE.—The original reservoir pressure as measured in the different fields varied between 2,300 and 2,400 psi. and may have been equal in all fields. Observations of the reservoir pressures to date indicate that the pressures are declining rapidly with production and the fields will produce with a solution-gas drive. Comparison of initial pressures in completed wells show that there is good communication in the reservoir and indicate that oil will drain to wells over considerable distances in a reasonable period of time.

5. PRODUCTIVITY.—Flowing-pressure tests have shown that the wells have declining productivity indexes; however, it is too early in the life of the fields to determine the real significance of declining productivity indexes but past experiences in other fields has shown that they are indicative of poor reservoir performance.

6. LIFTING.—Artificial-lift equipment should be of a type and size to economically lift small volumes of fluid with unusually large volumes of gas. Production problems will not be unusual but lifting costs may be high due to clean-out, restimulation, and the small volume of oil produced. The wells will probably flow most of their oil because of high gas-oil ratios.

7. GAS.—There will be relatively large volumes of casing-head gas produced which will be an important economic factor. Every effort should be made to utilize the gas.

8. SECONDARY RECOVERY.—Possibilities do not appear good with the present methods but there will be a very large quantity of oil as an invitation to develop new methods. To recover economically an added 10 to 15 per cent of the oil in place will tax the ingenuity and resourcefulness of the engineers and scientists.

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TABLE 2—SPRABERRY RESERVOIR FLUID PROPERTIES, BY FIELDS

Field—	Reservoir temp. (°F.)	Sampling pressure (psig.)	Saturation pressure (psig.)	Dissolved gas-oil ratio	Formation volume factor	Reservoir viscosity (cp.)	Oil gravity (°A.P.I.)
Germania	141	1,930	1,920	735	1.423	0.66	37.7
Tex-Harvey	138	2,240	1,834	753	1.417		37.0
Driver	137	2,262	1,959	714	1.396		37.1
Midkiff	136	1,893	1,872	730	1.413	0.70	37.7

oil has a gravity of 36.5° to 38.5° A.P.I. The gas flashed to atmospheric pressure has an average gravity of 1.09.

An analysis of representative separator gas is Tex-Harvey field is shown in Table 3. The separator conditions of sampling were approximately 20 psig. and 70° F. Gasoline content by test car varies from 0.70 to 2.50 g.p.m.

TABLE 3—SEPARATOR GAS ANALYSIS FOR AVERAGE TEX-HARVEY

(Specific gravity—0.853)

	Mol per cent	G.p.m.
Carbon dioxide	0.5	
Nitrogen	6.3	
Methane	68.7	
Ethane	8.9	
Propane	8.9	2.44
i-Butane	0.8	0.26
n-Butane	3.1	0.98
i-Pentane	0.8	0.29
n-Pentane	0.7	0.25
Hexane plus	1.3	0.56
Total	100.0	4.78

Well Logging

Few Spraberry wells have been logged through the productive zones with conventional electric-logging methods because nearly all of the wells have been drilled in with oil or oil-base mud or by cable tools. This has resulted in the general use of a gamma ray-induction log and to a lesser extent, use of the gamma ray-neutron log. The properties of the reservoir rock have made interpretation of the logs difficult. Experience and comparison of the logs with cores have improved the interpretations to the point where they are considered fairly reliable.

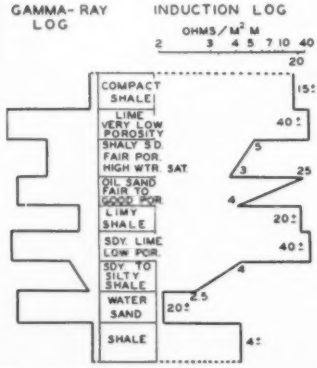


Fig. 2—Idealized gamma ray-induction log for Spraberry formations. (Courtesy Schlumberger Well Surveying Corp.)

An idealized induction-gamma ray log[2] is shown in Fig. 2. It shows how consideration of both logs at once permits a reasonable interpretation of the rock properties and fluid content to be made. New equipment for neutron logging is being developed which promises to improve the interpretations of fluid content of the rock.

Reservoir Pressures

The original pressures measured in the different areas or fields of the Spraberry trend varied from about 2,319 to 2,390 psi. in the upper zone at 4,400 ft. subsea or about 7,000 ft. subsurface. These pressures are from 500 to 700 psi. lower than normal for this depth, for which there is no apparent explanation. The narrow range of the highest pressures measured in the various areas, and the condition under which pressures must be measured lends weight to the opinion that the original reservoir pressure in all areas was equal.

Pressure decline. In the older and more fully developed areas the bottom-hole pressures are declining rapidly. With the pressure decline many wells are incapable of producing their allowables and the operators are reluctant to shut in the wells for pressure tests. As a result there is not sufficient pressure information at hand to intelligently analyze the pressure-production relationship.

The available pressure information on each field is shown in Table 4. In most fields production is primarily from the upper zone and the pressures measured in this zone. In Aldwell, Benedum, Flat Rock, and Weddell fields the production is mainly from the lower Spraberry zone and there is little bottom-hole pressure information available except some initial pressures.

In the development of the fields it has become apparent that newly completed wells offsetting or in the vicinity of the older producing wells have initial pressures less than the original reservoir pressure for the area. This evidence of pressure drawdown at considerable distances from producing wells has been observed generally in the areas being developed.

A good example is shown by information presented before the Railroad Commission of Texas by Sohio Petroleum Co. A portion of that information is shown in Fig. 3. This is a comparison of the initial pressures in wells with date of completion. The part shown was obtained during the development of two sections in Driver field in Glasscock County. For Section 1 the initial pressures are shown on the completion date by open circles, and static pressures taken in producing wells are connected by

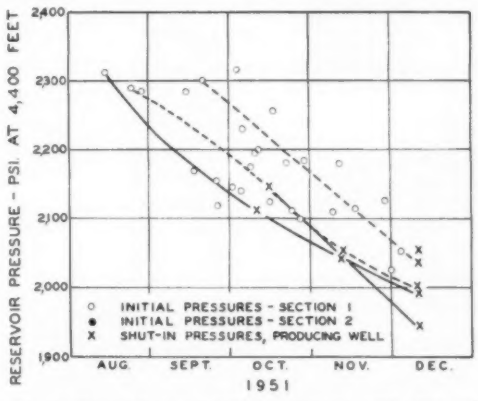


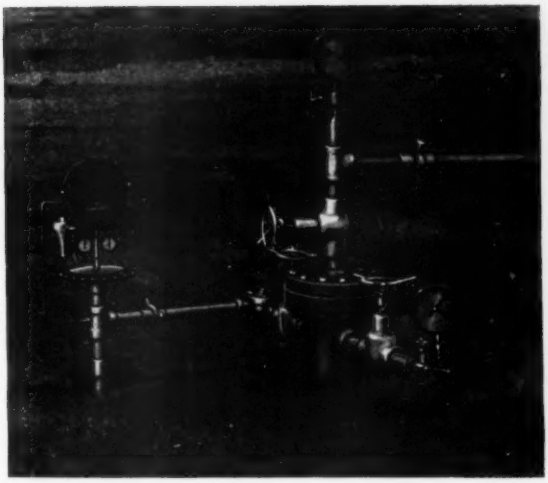
Fig. 3—Comparison of initial pressures with date of completion, Driver field, Texas.

TABLE 4—TABULATION OF SPRABERRY BOTTOM-HOLE PRESSURES, BY FIELDS

Field—	Original bottom-hole pressure, psig. (—4,400)	First survey May 1951: Bottom-hole pressure (psig.)	First survey May 1951: No. wells	Second survey end of 1951: Bottom-hole pressure (psig.)	Second survey end of 1951: No. wells	Total decline
Tex-Harvey	2,325	1,958	115	1,718	50	607
Germania	2,325	1,898	21	1,677	3	648
Midkiff	2,319	*2,110	12	1,998	19	321
Driver	2,372	....	....	2,043	31	329
Weiner-Floyd	2,376	....	....	2,014	9	362
North Pembrook	2,390	....	....	1,896	12	494
Pembrook	2,335	....	....	1,893	23	442
Aldwell	†2,345	....	....	....	....	....
Benedum	†2,396	....	....	....	....	....
Flat Rock	†2,365	....	....	....	....	....

*Run in September 1951. †Taken in lower zone.

CUT LIFT COSTS



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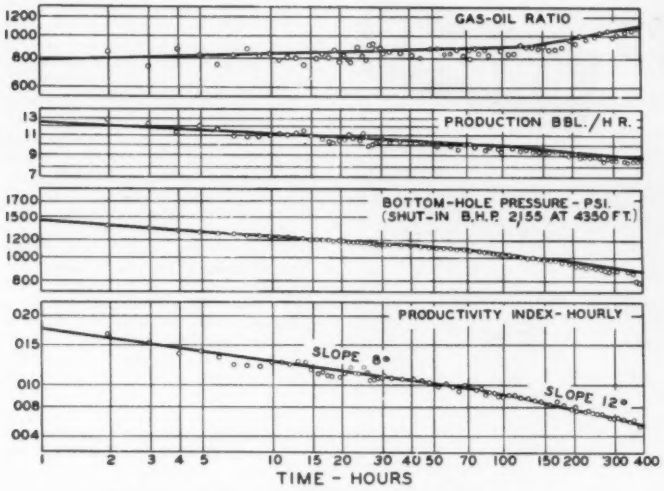

Fig. 4—Drawdown test on a well in Tex-Harvey field.

broken lines. For Section 2 the initial pressures are shown by filled-in circles and pressures in producing wells are connected by solid lines.

By December 10, 1951, 15 wells had been completed in Section 1 and 16 wells in Section 2. In each section the initial pressures show a definite trend downward with time, being generally parallel with the pressure decline observed in the producing wells. Such evidence of pressure drawdown by producing wells outside of their assigned 40 acres during the limited time of the observations indicates good communication within the reservoir.

Flowing-Pressure Tests

Flowing-pressure or drawdown tests in wells in the Spraberry-trend fields indicate that the productivity indexes of these wells have continuously decreasing values when measured over a period of time. The tests to establish and observe this condition were taken by continuous measurements of the production and bottom-hole pressure from the time the well was opened for test through a period of a number of hours or several days. From such tests the productivity indexes calculated for each hour form a straight-line curve on logarithmic graph paper when plotted with the productivity index as ordinate and time as abscissa. The hourly production, bottom-hole pressure, and gas-oil-ratio values also are straight-line curves when similarly plotted.

Fig. 4 shows the results of a long flowing-pressure test taken in a well in Tex-Harvey field. This well (A) is an upper-zone well and was completed February 16, 1951, with a potential of 307 bbl. and a gas-oil ratio of 730. The static bottom-hole pressure at the start of the flow test was 2,155 psi. The test was continued for 504 hours or 21 days. The productivity-index curve declined at a constant slope to 80 hours after which the rate of decline increased and continued through the remainder of the test. The production and bottom-hole pressure curves both break downward at 80 hours and are similar to the productivity-index curve. The gas-oil ratio increased slightly to 120 hours after which the rate of increase was more rapid.

On a number of tests the productivity-index curves increase in slope after the test has been in progress several hours. In some cases there is an increase in the rate of decline of production or an increase in gas-oil ratio or both. Often the change in

TABLE 5—SPRABERRY WELLS, FLOW TEST DATA

Well	Zone	Field	Completion date	Section open	Potential production, bbl. per day	Gas-oil ratio	Static bottom-hole pressure at test, psig.	Cumulative prod. to 2-1-52 bbl. per day	Test Feb. 1952 prod. bbl. per day	Bottom-hole pressure
A	Upper	Tex-Harvey	2-16-51	55	307	730	2,155	22,777	14	1,076
B	Upper	Tex-Harvey	8-28-51	130	387	518	1,909	11,937	61	1,367
C	Upper	Driver	10-18-51	150	469	539	2,078	9,472	447	1,973
D	Upper	Weiner-Floyd	9-20-51	164	248	880	2,012	8,985	92	1,471
E	Upper	North Pembrook	10-25-51	150	314	740	1,604	8,300	75	1,382
F	Upper	Pembrook	12-24-51	165	325	580	2,016	3,565	247	2,016
G	Lower	Aldwell	1-24-52	101	241	1,063	2,536	1,230	210	2,536
H	U. & L.	Tex-Harvey	4- 7-51	920	270	536	2,280	18,057	30	

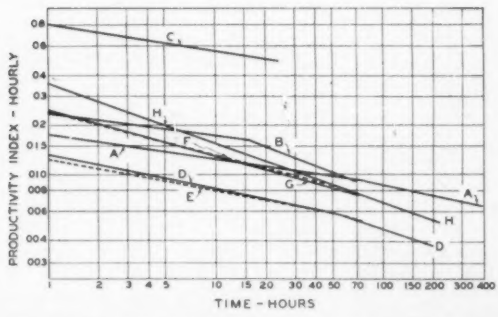

Fig. 5—Group of productivity-index curves taken on different wells in several Spraberry fields.

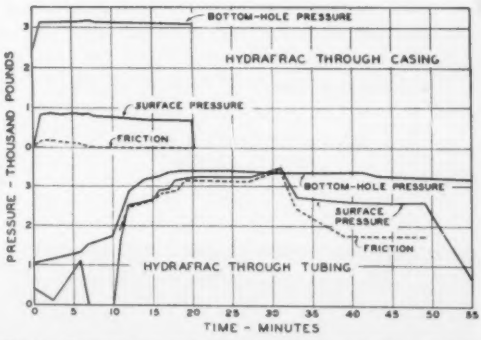

Fig. 6—Comparison of Hydrafrac treatment through tubing and casing.

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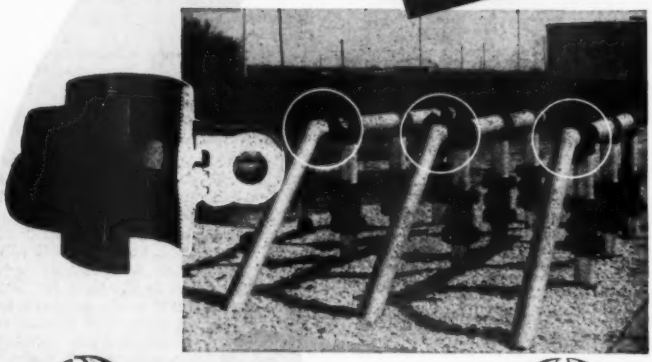

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slope of the curves occurs at sufficiently different times to raise the question as to whether they are directly related. The changes may be associated with the number, magnitude, and extent of the fracturing and the nature of the adjacent matrix.

Tests have been taken in a number of wells in the Spraberry fields and each has shown a declining productivity index. The productivity-index curves for eight wells are shown in Fig. 5. The first six wells are upper-zone wells, well G is a lower-zone well, and well H is completed in both zones. These curves show the initial values of the productivity indexes of the wells vary over a considerable range but the slopes of the curves are similar. Completion and recent test data on the wells are shown in Table 5.

Experience in many fields has shown that several predictions of future performance may be made for wells with continuing declining productivity indexes compared with similar wells in which the productivity index does not decline. Some of the predictions are: (1) the rate of oil production will decline rapidly; (2) the percentage recovery of the oil in place will be disappointing; (3) the gas-oil ratio will increase abnormally; and (4) the water production will be small for there will not be an effective water drive. The slope of the productivity-index curve appears to be a qualitative guide as to the degree that the predictions will be true. The history of many of the older wells tend to confirm these interpretations, although it is too early for final conclusions.

Producing Methods

In a fracture-type reservoir it is important to exert as little excess pressure on the formation as possible during cementing, drilling in, and completion procedures in order to not force extraneous material into the fractures. In the process of Hydrafracing through the tubing, pressures of 3,000 to 4,000 lb. are exerted on the surface connections. In order to determine the extent to which these pressures were transmitted to the formations, bottom-hole pressures were measured on several wells during the Hydrafrac treatment. One well was treated through the tubing and a second well through the casing. It will be noted from Fig. 6 that there was very little difference in the bottom-hole pressure of the two methods.

Of the 941 wells producing at the end of 1951, 809 were producing by natural flow, 129 were on the pump, and 3 were on gas lift. By far the largest number of wells on the pump were being pumped by the conventional method, i.e., rods and bottom-hole pump, there being only 33 wells on hydraulic lift and 5 of these having long-stroke lift. It is predicted the conventional-type pump will be

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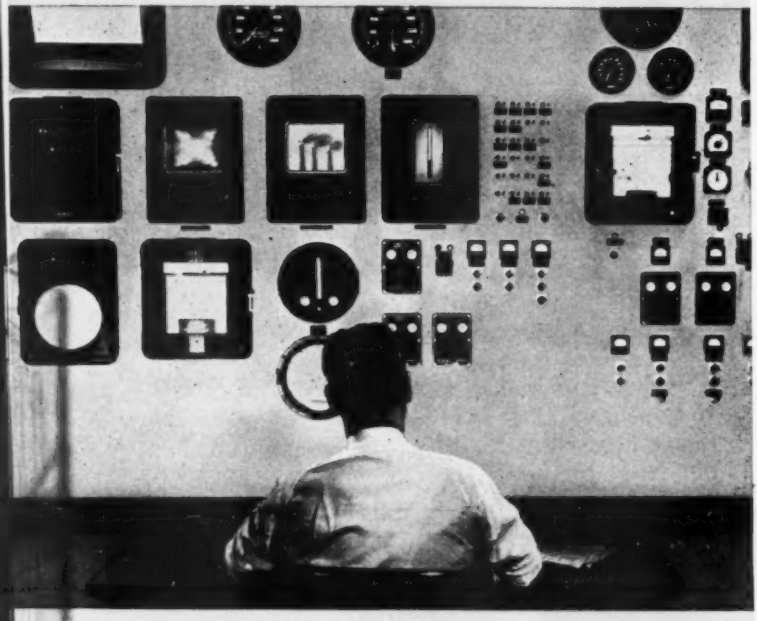

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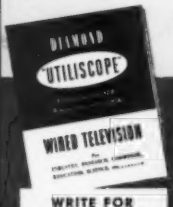

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Pumping problems.—It is anticipated that artificial-lift problems will increase with time although at present they are not particularly serious. On wells that have open hole, sand and shale sloughing off in the hole will cause pumping trouble as well as frequent cleanout jobs. Setting pipe through the pay and perforating will eliminate this trouble. Accumulation of paraffin in the tubing will also cause a certain amount of trouble. Water production should not be enough to require heavy equipment for lifting, although there will be sufficient connate water produced in many wells to cause treating problems.

These being solution-type reservoirs the gas-oil ratios will increase, and in many areas they already are on the increase. It is conceivable that with rapidly increasing ratios a large percentage of the oil will be produced by natural flow. It still will be necessary, as the gas is depleted, to resort to some form of artificial lift to produce the remaining recoverable oil.

When the fields reach their economic limits, which will be relatively early compared to the average field, it is estimated there will be left in the reservoir 80 to 90 per cent of the original oil in place. However, in producing the 10 to 20 per cent of the oil in place it is estimated that approximately 80 per cent of the gas in solution will be produced. Thus, it becomes apparent that the gas production should be curtailed until gasoline plants are available to process the gas, thereby increasing the gas revenue which will be a very important economic factor. To curtail the gas production it would be necessary, of course, to reduce the allowable oil production temporarily.

Inasmuch as the primary recovery will be low it will be necessary to consider the possibilities of secondary-recovery methods primarily because of the fractures and the demonstrated susceptibility of the reservoir rock to fracturing under relatively low pressures. At this time the known methods do not appear to be adequate for this type of reservoir. However, experimentation and research may result in devising some method of injecting gas or water, or both, that will be economically feasible.

Acknowledgment

The authors wish to express their appreciation to the many Spraberry operators furnishing information, and to Harry E. Legendre who furnished the production statistics.

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The Role of COST ACCOUNTING in Refinery Operating Control

"Cost control is more than the mechanism for reducing costs. The cost of an operation becomes significant only when related to accomplishment. It is the reduction of costs in order to accomplish a given end result that represents effective cost control."

by Emory M. Skinner*

EFFECTIVE cost control can be realized only through properly formulated economic studies and analyses of authentic cost records.

In contrast to other manufacturing operations where material, labor, and other expenses may be computed for each product or job as a continuous process cost; or a byproduct operation in which the production of a major product is accompanied by the production of one or more minor products, petroleum refining falls into the type referred to as a joint manufacturing operation in which no one of the many products recovered from a common source of raw material can be considered as a major product.

Students of cost accounting have developed various methods of determining individual product costs in a joint product operation including methods of average unit costs, the allocation of joint costs on the physical unit basis, and the allocation of joint costs on the basis of selling prices. While such procedures may have limited value in general corporate accounting, it is generally agreed that none of these methods is completely satisfactory. In order to study the efficiency of a joint product operation and exercise effective cost control, our cost analyses must include other concepts.

Evaluation.—The most significant figure representing the refinery operation is the value of the over-all result recognizing the applicable input cost, total operating expenses, and total product value. In most cases, any attempt to evaluate independently the finite accomplishment of an intermediate step or process within the refinery will lead to an approximation only which may be definitely misleading. To establish only expense items is not sufficient; the accomplishment must also be evaluated. The value of the accomplishment of an intermediate refining step involves the pricing of intermediate or unfinished stocks, some of which may have no established commercial value.

Any developed value of such stocks is an approximation and may make the entire evaluation unreliable. Likewise certain expense items, such as the cost of steam, varies with the total quantity used and this total cost change must not be reflected upon only the single process in question.

1. Economic Studies

Substantially all problems of refinery economics or cost control fall into one of the following classifications:

1. The construction of an entirely new facility, or the addition to or replacement of equipment at an existing plant.

2. A change in throughput or processing procedures, or the manufacture of a new product with existing facilities.

3. The study of the cost of specific activities such as a maintenance procedure of certain operating manipulation.

The procedures used for evaluation and as a basis for the justification of new or additional facilities are quite uniform. In all cases the earning position of the existing plant is compared with that calculated for the revised plant and the gain in realization must amortize the new facilities. We will not dwell further upon this phase of the problem other than to point out certain elements of detail which are common to the solution of other problems.

In general, the study of the costs of specific activities or manipulations embody the elements of established cost accounting procedures. The degree to which the costs of such specific manipulations can be determined from the routine accounting records depends upon the detail in which such data are recorded. Frequently we cannot justify every-day routine accounting to this extent. It is best that we supplement the general accounting with the greater detail in specified areas for a limited period of time or set up a program of time or performance study as needed. The most useful implement for this purpose is an accounting system built around a job or work-order system.

Process problems.—The most significant class of economic study, but also the most difficult to execute with satisfactory accuracy, is the broad problem of investigating various processing procedures. Examples of this class of problem are:

1. Changes in the amount of crude processed which, due to limitations of certain facilities, forces a different ratio of the various products.

2. The processing of crudes of different characteristics.

3. The production of a different complement of products from a fixed crude run and the same facilities.

4. The effect of operation severity in certain processes such as temperature of recycle ratio in cracking.

These, as well as many other problems, cannot be localized to permit evaluation within the confines of one processing unit. Several processes, possibly the entire plant operation, are usually affected to some extent, and in many cases the magnitude of the effect is quite obscure. Particular attention must be given to utilities such as steam. The cost of steam is not independent of the amount produced since both the fixed and variable elements in the cost of steam are considerable.

The unit cost of steam is different for each total quantity produced. Likewise, throughout the entire operation there are expense items which are fixed regardless of the operation, expense items which are a function of stream days, expense items which vary directly with the amount of oil processed, and other expense items which change by specific increments.

Evaluating plant operation.—For problems involving these far-reaching interrelationships, the most reliable answer will be obtained by evaluating stepwise the entire plant operation.

*Deceased. Author was technical director, Augusta, Kans., refinery, Socony-Vacuum Oil Co., Inc. Paper presented at annual meeting of W.P.R.A. March 31-April 2, 1952, San Antonio.

The significant steps in an evaluation of this type are:

1. Starting with the crude oil and other input materials, tabulate a material balance showing the quantity of products produced from each processing step, and carried out to the desired complement of finished products. In heavy-oil processes such as vacuum distillation, most lubricating-oil processes and many redistillation steps, a volume balance is sufficient. In any process which results in a change of chemical composition or physical state such as cracking, vapor recovery and alkylation, a weight balance must be developed. Yield data for the various processes may be developed from plant measurements, specific test run procedures, or laboratory determinations. Unit process operations should be calculated on a no-loss basis, with normal handling losses reflected only in finished products.

2. Establish the required operating schedule for each process including turnaround time, the method of operating units which may not be fully loaded, and any blocked operations which may be required.

3. Develop realistic expenses for each operation compatible with the required mode of operation. All labor expense and associated charges should be made to the department where that labor normally functions. Material and operating supplies should be listed where used. Utilities and similar services should be accumulated in quantity and the expenses developed at the point of production. A complete maintenance schedule should be developed and priced. In order to avoid overlooking some expense item that is not obvious, all service and overhead items should be tabulated at their normal or established cost.

4. Develop the input cost and production value by pricing all petroleum commodities at the current plant price.

5. From these elements of expense and realization, a statistical profit can be determined.

6. Make this evaluation for the normal plant operation or base case, and for any modified operation that is under consideration. The difference in profitability of the two cases must be reflected upon the modification under study.

This approach to the solution of these problems many appear to be a prodigious task. That impression will be substantiated if proper preparations are not made. In fact, without benefit of a systematic procedure and basic data developed through a reliable manufacturing accounting system, the evaluation can become so complex that minor variations in the treatment of certain production and expense items will overshadow the true difference in the process schemes under study. On the other hand, with a fully developed base case for normal operations and a cost-accounting system which produces true operating statements, the evaluation of alternate operating procedures can be developed with reasonable accuracy and effort. Likewise, the periodic statements of actual operating results derived through a suitable accounting procedure can be compared directly with this normal or base case to establish a measure of operating efficiency.

"The interests of society are safeguarded through the vigorous efforts of individual enterprise in this highly competitive business which force a high degree of efficiency to insure survival. It is in our search for an accurate measure of this efficiency that we become conscious of cost control."

In reference to the justification of new facilities, it was indicated that it is common practice to consider the effect of such facilities upon the earning position of the entire plant. Studies for this purpose should be carried out in a manner similar to that which has just been described for studying processing changes.

2. The Cost-Accounting System

A discussion of refinery cost accounting was presented at the regional meeting of the Western Petroleum Refiners Association at Wichita on June 10, 1949. Believing that the fundamental concepts presented in that paper are correct, some repetition is unavoidable in any further reference to that activity.

The information obtained through the channels of cost accounting can be one of the most useful tools available to refinery management at all levels for the successful direction of refinery activities. On the other hand, the mere fact that certain data have been assembled through accepted accounting procedures does not insure their usefulness in the control of manufacturing operations, nor the interpretation of the results of such operations.

Operators' accounts.—Before we examine the aspects of cost accounting as may be applied to petroleum refining, let us understand the objectives of any cost accounting. At no time do the results of accounting activities exercise control; control is a matter of executive action, a large part of which may be based upon the data and information made available through cost accounting and analysis. It is important, therefore, that our accounting be based upon the principle of "Accounts for Operators" rather than "Accounts for Accountants." While the basic principles of bookkeeping must be followed, the reports resulting from the system must reflect the operations clearly and accurately. We must first determine the type of data and reports that will be most useful to the operators and then develop the cost methods that will produce them.

Who are the people for whom cost reports are prepared? Broadly three classes of executives and their needs may be recognized:

1. Operating departmental supervisors and foremen, who are in direct charge of the day-to-day activities of the specific plant functions, must have detailed reports which inform them of the costs and accomplishments of current performance. Historical records are of only secondary value. Supervisors at this level are directing activities which will be consummated in the immediate future. They need data which will assist in their judgment of the result to be expected from a specific operational manipulation.

2. Plant superintendents, works managers, and heads of staff departments, such as the chief engineer, need reports which present the overall results of unit operations and of the total plant operation. These reports need to encompass the shortest reliable accounting period consistent with the nature of the operation. Executives at this level are concerned with the coordination of the various units of the plant as required to meet the needed production schedule, and to accomplish this in a manner to obtain the maximum earning.

3. General executives, including corporate officers, need reports of the broadest scope and, as far as practical, carefully summarized or condensed. These individuals are concerned with results of a longer term in order to direct the activities of their own company to meet the external forces of society.

All of these executives and supervisors have one common objective, that of conducting the enterprise on a profitable basis. This, of course, will result from maximum accomplishment at minimum expenditure. For this there is no magic formula. The ever-changing situations, both within and surrounding the enterprise, demand constant surveillance of the trend of cause and effect.

The only source of adequate knowledge of such surveillance is the accurate record of current activities. This record can be produced through the channels of cost accounting, and the solution to the various problems will result from an adequate analysis of this record. The first step, therefore, is to set up and maintain a cost-

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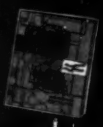

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accounting system which will yield the data as needed by the men charged with the responsibility of directing the operation. The system must yield detailed data for those who are concerned with specific activities, as well as summary results for those charged with the broader aspects of coordination.

3. Accounting for Operations Control

This discussion will not attempt to present a complete cost-accounting system for a petroleum refinery. Certainly the sound principles of accounting are being applied by all successful operators. It is possible, however, that in an enterprise so complex as petroleum refining some misapplications have been made of sound accounting procedures and some possible applications have been overlooked. The full value of the accounting which is being conducted may not be realized due to a lack of thorough analysis. Let us examine the nature of the oil-refinery business in an effort to disclose fallacies which may have crept into our accounting practices, and to uncover activities wherein further accounting detail may be profitable.

In order to expedite our considerations, we can divide the field of refinery accounting into two broad classes according to the end use of the results.

Types of accounting.—One class, financial accounting, includes those records which are required to represent the manufacturing activities for purposes of legal and financial control. Such records are compiled through the established procedures of balance-sheet accounting. The accumulated accounts may or may not bear a specific relationship to the physical activities which were performed in the plant. The definition of many of the accounts is set by the accepted legal and financial practices. A review of this phase of accounting is not within the scope of this paper.

The second broad class of refinery accounting, which may be referred to as operational accounting, includes those records which are useful to manufacturing management as a basis for the active direction of manufacturing manipulations. It is this class of accounting which may be worthy of further consideration.

Grouping data.—The basic data entering into these two broad classes of accounting records originate from the same sources of expense. As dictated by the end use of the record, the treatment of the data must follow different courses if the results are to be of useful form. In financial accounting, the data must be grouped according to generally accepted business classifications. Many of these groupings have no common denominator which bears a relationship to the elements of the manufacturing activities which produced the result. In contrast to this, for operational accounting to be useful in the direction and analysis of manufacturing activities, the data must be grouped and recorded in a system more nearly parallel to the physical aspects of the plant operation. The facts must be presented in a fashion which will relate cause and effect in order that conclusions may be reached and future action intelligently directed.

But the most meticulous recording of data in a system carefully designed to represent specific elements of the activity will produce, in itself, no results. These data must be analyzed in the light of the physical operations which were performed and the production which was realized. Such analyses must embody our best knowledge of the fundamentals of economics, engineering, and process technology. Continuous and thorough cost analyses of this type based upon an accounting record which segregates accounts definable in terms of significant operating variables, will yield knowledge of value in operations control.

4. The Accounting System

The foundation of an adequate system of cost accounting and analysis is the chart of accounts for expense distribution. Since accounting for operational purposes must parallel the physical aspects of the plant and its operation, the Chart of Accounts must be subdivided sufficiently to permit the definitions of the accounts to be accurate and realistic for individual parts of the plant and fundamental elements of its operation. In order to facilitate accounting manipulations, it is customary to use some system of letter or number symbols to represent the various accounts. It is highly significant that such a system of accounts and symbols be arranged in a manner to accrue costs to significant cost centers and to detail accounts having a characteristic common denominator.

Subdivision of accounts.—Summamation of all accounts represents, of course, the operation of the entire plant. The first subdivision of the entire plant should be that of grouping all of the facilities which are involved directly in the refining of a barrel of oil into what may be termed Productive Facilities, and grouping all of the activities which do not have to do specifically with the refining processes into what may be termed Additional Plant Expense. The general group of Productive Facilities may or may not be further subdivided into Light-Oil Processes, Lubricating-Oil Processes, and Auxiliaries.

The group of Productive Facilities will include all unit processes such as crude distillation, cracking, vapor recovery, specialty stills, treating plant, pumping, loading rack, boiler house, water distribution, water treating, fuel distribution, and control laboratory. Each such unit process should be represented by a unit expense account. Care should be exercised in the definition of each unit process, so that the start and the finish of the work of that process can be recognized and measured.

The nonproductive facilities grouped as Additional Plant Expense should be subdivided likewise into the recognizable unit operations such as yard maintenance, fire protection, safety department, plant offices, engineering department, general supervision, fire insurance, and medical department.

It will be noted that maintenance facilities have not been listed with either of the above groups. Further examination will indicate that by far the greater amount of maintenance applies to the true Productive Facilities; therefore, it will be equitable in most cases to classify the maintenance overhead facilities such as storehouse, mechanical shops and automotive machines as Productive Facilities.

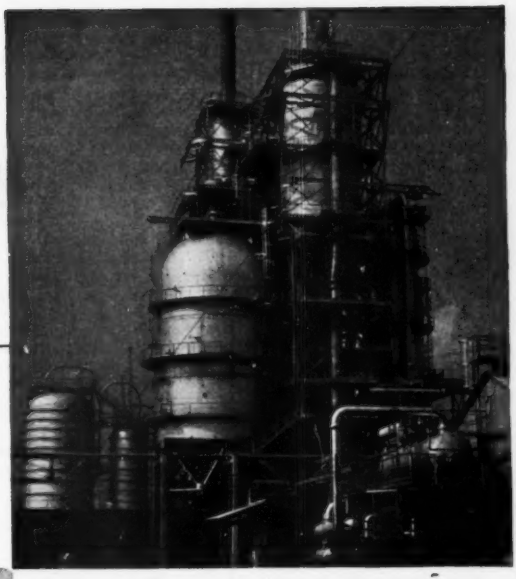
Accumulation of expenses.—These two general groupings of plant facilities represent our first move to classify operations according to a common denominator. Broadly speaking, the total expenses for the Productive Facilities bear a relationship to the volume of oil processed. The Additional Plant Expenses group is more closely related to the element of time, at least within a rather wide scope of operation. As a result of this, we have a rough differentiation between fixed and variable expense as applied to major changes in the volume of oil being processed. The specific elements of expense involved in each of these unit processes or facilities are accumulated according to a detailed expense code. These detail codes should be limited in scope and precisely defined. The detail code may identify specific items of apparatus such as pumps, control equipment, piping and vessels; specific items of supplies or services such as chemicals, operating supplies, telegrams, maintenance material, stationery and printing; or specific types of pay roll such as operating labor, maintenance labor, supervision, sick leave and vacation time.

We will define typical examples as follows:

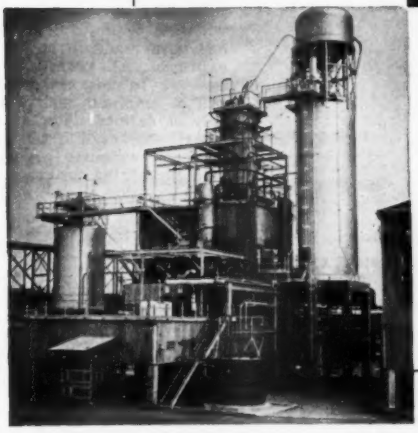
Division 1—Productive Facility.
Unit 48—Boiler House.
Detail 100—Operating Labor.

"A well-integrated system of expense accounting, cost analysis, and economic study can serve only as the vehicle for cost control. Control must result from the action taken by an informed management."

Cat-Lube* does double duty for Sohio



Sohio's continuous contact filtration and catalytic cracking units



The Sohio lube finishing unit represents the most advanced engineering concept for the continuous contact filtration process. In this plant, operating and maintenance costs are reduced and capital investment was lowered as compared to earlier installations.

Fluidized handling of the adsorbent permits a dust-free operation and hence a marked improvement in unit housekeeping. These are obvious important advantages but Sohio has added to them equally important economies through the use of Filtrol's Cat-Lube (Adsorbent Catalyst).

FILTROL DOUBLE-DUTY CAT-LUBE IMPROVES MAJOR OPERATING ECONOMIES

Filtrol Cat-Lube at Sohio's Lima plant does double duty. After bringing the finished oil to high specifications demanded of the decolorizing step at the lube plant, the spent adsorbent filter cake is slurried with fresh cat cracker feed and pumped to the fluid catalyst cracking unit. Although this unit is not equipped with a precipitator, activity maintenance is good and the "cat cracker" has continued to show a high level of performance.

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CATALYSTS AND ADSORBENTS

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Detail 300—Operating Supplies.
Detail 500—Maintenance Labor.
Detail 600—Maintenance Material.
Detail 3—Vacation Pay.
Detail 55—Water Purchased.
Detail 13—Pumps.

Then specific expense charges will be identified as:

Vacation pay for boiler house operator, 1-48-103.

Water purchased for boiler house, 1-48-355.

Maintenance labor to repair boiler house pumps, 1-48-513.

Maintenance material to repair boiler house pumps, 1-48-613.

A system of maintenance job cost accounting can be added by including a section in the code for work-order numbers. For example, Work Order 217 may read, "Replace shaft in pump No. 14 at the boiler house." The code covering these charges would read as follows:

For labor, 1-48-513-217.

For material, 1-48-613-217.

The expenses will accrue to Work Order 217 and clear to Unit 48 for the plant expense statement. The closed work order carrying the details of cost is filed with the equipment record file of pump No. 14.

Expense statements.—It is conventional practice to use the calendar month as accounting period to close accounts and summarize the results. The complete detail of all accounts should be available to the group handling process and economic studies. Due to operating variations serious errors in cost factors can result from summaries made for a prescribed period such as 1 month or 6 months. No expense data are of use for analytical purposes unless the specific accomplishment is known definitely. Some elements of expense, such as fuel burned, must be related to a known operating condition, while other expense items such as maintenance must be studied over a long period of time. Generally speaking the longest possible period over which operating conditions remain constant will give the most reliable cost data. It is obvious that the derivation of useful cost factors cannot be produced through routine accounting channels.

This activity must be carried out through the proper collaboration of accounting, operating and technical agencies. This is the most critical phase of effective cost control, yet the portion of the work that is most frequently slighted. The most elaborate system for cost analysis and process economic study will come to naught if reliable cost factors are not available.

Form of statement.—With the detail of expense accumulated for the accounting period, summary statements can be prepared as desired. For each level of management, statements should be prepared commensurate in detail with the nature of that mananger's responsibility. An operating department supervisor will wish to see the expenses of each unit process under his jurisdiction expressed as: operating labor supervision, labor burden, fuel, utilities, operating supplies, maintenance labor, and maintenance material. Such statements should be prepared monthly for every department or unit cost center. The maintenance supervisor will wish to see the detailed expenses incurred by each job work order which comes to his department.

A suitable form of departmental statement is shown in Table 1. The works manager will be concerned with the total plant expenses expressed in the fundamental elements of labor, material, fuel and overhead accounts. Since expenses become a measure of operating efficiency only when associated with the corresponding accomplishment, the total plant

TABLE 1—DEPARTMENTAL EXPENSES

——Unit	Six Months——	
		July
Input—Barrels		
Operation		
Labor—Direct		$
Labor—Supervision		$
Labor Burden		$
Supplies & Miscellaneous		$
Fuel		$
Fuel, M.M. B.t.u.		
Steam		$
Steam, M. Lbs.		
Power		$
Power, Kwh.		
Water		$
Water, M. Gallons		
Sub Total		$
Maintenance		
Labor—Direct		$
Labor—Supervision		$
Labor Burden		$
Material		$
Sub Total		$
Total		$

TABLE 2—MANUFACTURING EXPENSE

	——Refinery	Year——	
			January
1	Productive Facilities' Expense		$
2			
3	Operation		
4	Labor		
5	Labor Burden		
6	Fuel—Refinery Products		
7	Fuel—Purchased		
8	Power—Purchased		
9	Water—Purchased		
10	Chemicals		
11	Supplies and Miscellaneous Expense		
12			
13			
14	Total		
14	Maintenance		
16	Labor		
17	Labor Burden		
18	Material		
19	Contracts		
20			
21	Total		
22	Productive Facilities' Expense—Total		
23	Additional Plant Expense		
24	General Plant Overhead		
25	Facilities and Services		
26	Taxes and Insurance		
27	Credits		
28			
29	Total		
30	Total Direct Plant Expense		
31	Miscellaneous Charges		
32	Depreciation		
33	Overhead, Division or Company		
34			
35	Total		
36			
37	Total Input Cost		
38	Production Value		
39	Profit or (Loss)—Statistical		

statement is enhanced by the inclusion of input cost, production value and a statistical profit. The nature of data which make up this type of summary statement is shown in Table 2.

Since results for a limited period of time may be colored by operating irregularities, statements of this nature should be prepared in a progressive fashion, giving the results for preceding periods for comparison and to indicate any prevailing trend.

Prorating costs.—The specific handling of certain features of the accounts is worthy of consideration. We referred above to labor burden as an element of expense. This labor burden includes the company cost of annuity and insurance, vacation pay, sick-leave pay, holiday pay, federal old-age-benefit taxes, unemployment-insurance taxes, and workmen's-compensation insurance. These expenses are related directly to the pay roll, and in total are equivalent to a substantial portion of the pay roll. A better understanding of labor costs will be obtained if this labor burden expense is recorded along with the pay roll to which it is associated. It will also be noted that no reference has been made to any proration of expenses. All prorations should be avoided. In most cases, the proration will be empirical and of significance only as defined. A more useful cost report will result if the general and overhead expenses are reported as such permitting proration as needed in the solution of specific problems.

The cost of plant produced utilities such as steam should be distributed among the unit processes on a volume as well as a dollar basis. The true cost of steam includes fixed costs such as depreciation and taxes, semifixed costs such as operating labor and maintenance, along with the variable costs of fuel and boiler feed water. The unit cost of steam varies with the total plant demand. The individual users of steam should be advised of the incremental cost of steam as will apply to any increase or decrease in the quantity used.

In many situations it may not be practical to record as a routine accounting procedure all of the data which are necessary for the thorough analysis of the operation. Certain characteristic performance factors may be evaluated to best advantage through process engineering studies and test operations. It is essential that the routine accounting and these special studies be properly coordinated in order that each will supplement the other in arriving at the complete record.

Production value.—This careful compilation of expense factors is essential in order to have the required tools for the analysis and study of all operating variables. But even though comparisons of manufacturing expenses are useful and important, these comparisons may lead to erroneous

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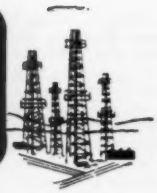

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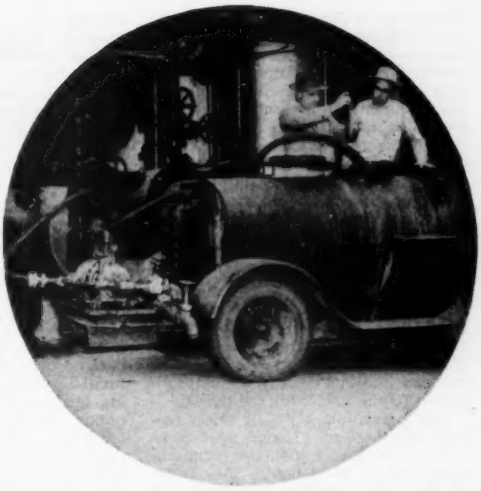

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conclusions if considered alone. Many situations arise where a change in operation with increased expenses is justified because of the greater degree of product upgrading. The accomplishment of the refinery, therefore, also must be measured in some manner so that it can be compared with the expenses incurred in its achievement. Although simple operations can be measured by physical means, such as yield and quality indexes, such measurement is not adequate for complex operations. For the latter, especially for presentation in summary reports, the accomplishment or production of the refinery should be translated into dollar values. When so translated, it becomes a factor along with expenses and raw material costs in the determination of the profit for the period.

The presentation of all these factors together on a single statement helps to emphasize their interrelationships and to keep before the reader of the statement the importance of the final net profit. The manner of determining the dollar value of refinery production is important. In financial accounting all production is valued at cost until sold or disposed of otherwise. Therefore, with large inventories common to petroleum refining and with the volume of sales in a month rarely or never in step with current production, it is apparent that book profit for a short period is not fully satisfactory for operating control. The book profit for any month reflects not only the profit on sales from current production, but also sales from prior production, methods of costing inventories, and other factors

The most satisfactory means of calculating profit for the purpose of operating control requires the evaluation of current actual production based on average refinery billing prices in effect throughout the month. In this way the accomplishment of the refinery shown in dollars will not reflect inventory fluctuation and other factors not applicable to the period. This evaluation of the current production should be arrived at by the realistic pricing of the actual production, both finished and unfinished. No attempt should be made to theorize a one hundred per cent finished yield, since this would involve assumed end products which may not fit the demand schedule, and assumed incremental capacity which may not be present in the existing equipment. In other words, value the production which actually resulted from the plant as it was operated for the period and in keeping with the expenses which were actually incurred.

Input cost.—Another major element contributing to the result from a given operation is that of raw material or "Input." It will be found helpful to define Input to include all raw materials and charge stocks which becomes a part of finished production, such as crude oil, natural gasoline, compounding materials, additives, tetraethyl lead and dye. By this definition we will avoid clouding the expense statement by some very costly items which are dictated by factors completely outside the jurisdiction of the plant operator. Furthermore, the handling of many of the nonpetroleum materials is little more than simple brokerage. For example, tetraethyl lead is frequently reported as chemical expense under the heading of Treating and Blending. In most cases the magnitude of the TEL cost will be many times greater than the total of all other expenses in that unit. Possible economies in actual treating and blending manipulations may be overlooked since they appear small in so large a total. By removing the cost TEL from this account, minor improvements in operating technique will reflect in the expense statement. Still more pronounced distortions of this type can result in the use of compounding agents in lubricating oil and grease manufacture.

Cost control.—Finally, a well-integrated system of expense accounting, cost analysis and economic study can serve only as the vehicle for cost control. Control must result from the action taken by an informed management. The compilation of data is of no avail if an effort is not made to interpret that data in terms of physical activities and to search for improved methods of conducting the activity in question. The largest single items of expense are labor and fuel burned. The greatest contributors to an excess of these costs are poor facilities and incorrect manipulations. The responsibility for improved results rests with an informed supervisory and technological staff armed with the authority to act.

Exploratory Drilling in 1951

(Continued from page 105)

duction, automobiles, etc.), must be classified solely on its own merits and not on those (assets, field of operations, etc.) of its parent company.

4. In the case of a "holding" gas company, which has one or more subsidiaries, each limited in its operations to a single state, these subsidiaries are to be classified as "major" if the current assets of the holding company are more than 20 million dollars, and of course, also, provided the subsidiaries are engaged, at least in part, in the production of natural gas.

Our statistics showed that in the country as a whole in 1951, 1,180 new-field wildcats (227 producers and 952 dry holes) were drilled by majors; 4,287 new-field wildcats (376 producers and 3,911 dry holes) were drilled by minors and independents; and 712 new-field wildcats (71 producers and 641 dry holes) were drilled by minors or independents with the drilling financed by major companies.

Size of Discoveries

Some years ago we included in our annual report a table showing the number of fields discovered each year, from 1938 to the year preceding the year reported, these fields being grouped according to a rough estimate of their total ultimate reserves from the date of discovery. The fields were grouped according to these estimates: "A" meaning a total ultimate of 50 million barrels or more; "B," from 25 to 50 million barrels; "C," from 10 to 25 million barrels; "D," from 1 to 10 million barrels; "E," less than 1 million barrels; and "F," abandoned. Gas fields were not included unless they also produced oil or condensate. A few fields were omitted where satisfactory estimates were not readily obtainable.

In the present report, we are repeating our approach of last year. We are recording, in Table 11, estimated total ultimate reserves only for the discoveries of 1945, 1948, and 1951. This is the third year in which we have attempted such an estimate of the fields discovered in the year just closed. Previously we allowed a year to elapse. The estimates in Table 11 were all made in January 1951. Those referring to discoveries in 1945 were revisions, where revisions seemed necessary. Since the discoveries of 1948 had not been estimated by this committee before, the estimates here presented are not revisions, but they are made with 3 years of production history to guide in estimating.

In revising the earlier estimates for discoveries of 1945, one B was lowered to C; one C was raised to B; three D's were raised to A; six D's were raised to C; five D's were lowered to E; one C was lowered to F; one E was raised to A; three E's were raised to C; twenty-eight E's were raised to D; twenty-seven E's were lowered to F; and four F's were moved up. It is our plan to make these estimates of the fields discovered in any given year only 3 years and 6 years, respectively, after their dates of discovery, with a rough preliminary estimate given just after their discovery. It is very doubtful whether the first estimates for the discoveries of the year just elapsed can be of much significance, for not enough is yet known of the various factors which should enter into an estimate of this kind.

Exploratory Drilling in Canada

In western Canada, in 1951, 483 exploratory holes were completed, 134 of these being producers and 349 being dry holes. The producers included 56 oil wells, 75 gas wells, and 3 condensate wells. A total of 1,994,027 ft. was drilled, 552,631 in producers and 1,441,396 feet in dry holes. This means that 27.74 per cent of the exploratory holes and 27.71 per cent of the exploratory footage were successful. There were 2.6 ft. drilled in dry holes for every foot drilled in producers. For every producer completed, 2.6 dry holes were abandoned. The aver-

age depth of all the exploratory holes was 4,128 ft.

Among the 378 new-field wildcats completed in western Canada in 1951, 80 were successful and 298 were dry. In other words, new-field wildcatting was 21.16 per cent successful. One producer was drilled for every 3.7 dry holes. The bases for location of the new-field wildcats in Alberta are shown in Table 13.

In eastern Canada, 56 exploratory holes were drilled, with a total of 103,967 ft. Ten of the 56 holes were successful, 8 as gas wells and 2 as oil wells, and all in southwestern Ontario. In these producers, 14,146 ft. were drilled. Of the 56 holes, 17.8 per cent were successful. 13.6 per cent of the exploratory footage was in successful holes. For every foot drilled in producers, 6.3 ft. were drilled in dry holes. The average depth of hole was 1,856.5 ft.

Data Available on Edwards Limestone Cores

The Bureau of Economic Geology, University of Texas, announces that prints of five preliminary charts containing data on a study of Edwards limestone cores are available on an open-file basis at the bureau. The project for the study of the cores is being carried on by Dr. Dan E. Feray and is supported by grants from a number of oil companies and service companies. The charts show lithology correlated against permeability, porosity, mineral content, insoluble residues, and acid reaction in the Edwards limestone from wells in Caldwell, Guadalupe, and Milam counties, Texas. A chart showing one additional well will be available in a short time.

BOOK

FUEL AND POWER IN CAPTIVE MIDDLE EUROPE. By Jan H. Wszelaki. Published by Mid-European Studies Center of the National Committee for a Free Europe, Inc., 110 West Fifty-Seventh Street, New York. 63 pp. 25 cents.

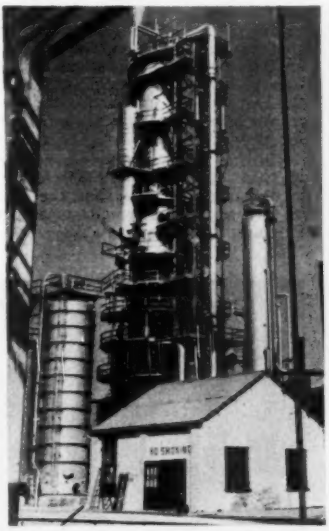
This booklet is a study of the fuel position, petroleum and natural gas included, of the Russian satellite area in eastern Europe by a former member (1918-1945) by the Polish diplomatic service who prior to the war was secretary and counselor at the Polish embassies in London and Washington. The foreword is by H. B. Miller, former head of the information department of the American Petroleum Institute who is now president of the National Committee for a Free Europe. The author gives credit to Dr. G. G. Rosu Washington, D. C., for furnishing information concerning oil production in Romania. The entire study gives a concise summary of energy availability in the satellite area and contains three chapters, one on petroleum, another on natural gas, and a third on synthetic fuels of especial interest to oil men. Wszelaki believes that by 1954 total oil production in Communist eastern Europe may reach about 13,000,000 tons, or about 260,000 bbl. daily. Another 2,500,000 tons, or about 50,000 bbl. daily, of oil may come from the synthetic plants. Correctly, the author points out that the success of the industrialization program in eastern Europe depends on the development of adequate fuel supplies.

Cat Cracker Capacity Boosted To Triple Design Capacity

INITIAL design throughput of the Aurora Gasoline Co. U.O.P. cat cracker at Dearborn, Mich., was 3,500 bbl. per day of gas oil. This has been increased to between 9,000 and 10,000 bbl. per day without rebuilding the entire unit. To achieve this capacity boost a new main fractionator was installed and compressor horsepower increased. Mechanical design changes were also made in the stripping section of the cat unit.

Feed.—Charge to cat unit is 25 per cent virgin, 25 per cent vacuum, and 50 per cent visbreaker gas oils. This combined charge mixture has an average gravity of between 29° and 31° A.P.I. and is produced for the catalytic cracker in original topping units, a new 20,000-bbl. crude unit, vacuum units and the visbreaker, operating to produce a maximum of material desirable for cat cracking.

Triple capacity.—The former main fractionating column had an inside diameter of 6½ ft. which was ample for the original design rate. However, at the projected rate of some 10,000 bbl. per day it became evident that vapor velocity would be too high if this tower were employed. Accordingly, a new tower with an inside diameter of 9 ft. was installed. Air compression was increased by 2,000,000 cu. ft. in order to match the carbon-burning rate to the new throughput capacity. Two 400-hp. compressors were also added for adequate handling of the uncondensed vapors and gases from cracking.



Aurora Gasoline Co. was able to boost gas-oil charge capacity of this U.O.P. cat cracker from design rate of 3,500 bbl. per day to between 9,000 and 10,000 bbl. daily without complete rebuilding of the unit.

The charge to the cat cracker was stepped up by degrees, the unit being balanced from time to time, until a top throughput of 11,000 bbl. was obtained on an experimental run. Yields ranging from 9,000 to 10,000 bbl. per day have been commonplace for several months.

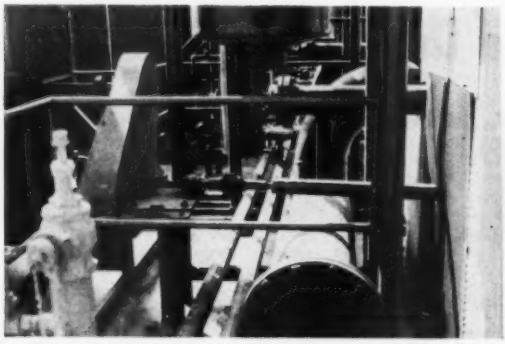
Stripping section.—The unit was originally equipped with an outside as well as an inside stripping section, but the outside vessel was redesigned to incorporate sloping side-to-side pans. These pans, similar to those originally installed horizontally, slope at an angle of about 35°. This design has been found advantageous due to the fact that the stripped catalyst will slide from the sloping plates more easily than from flat, horizontal plates.

Operating conditions.—A charge heater was also added for the cat unit, preheating the feed so that the gas oil will enter the reactor at a temperature approaching vaporization temperature of the charge. Reactor temperature is held at 900° F. with a maximum charge of 10,000 bbl. per day, while the regenerator temperature is normally held at 1,125° F. Coke laydown for an average run is 4.2 per cent and the conversion of gas oil to gasoline averages between 50 and 55 per cent.

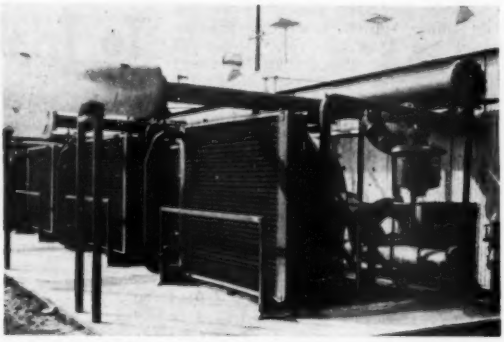
The points of most rapid deterioration of equipment by erosion are in the cyclones and in one bend in the catalyst line just before entering the reactor. Sections cut out of this line showed that normal wall thickness remained above and below this bend. Repairs were made by setting a similar bend into the catalyst line when the plant was down for replacement of cyclone. Otherwise, inspection indicated that adequate wall thicknesses remained for continued operation.

Average yields for cat cracking on a charge of 9,000 bbl. per day are:

	Wt. %	Vol. %
Raw oil charge, 31° A.P.I.	...	100.00
Debut. cat. gasoline, 60° A.P.I.	...	40.00
Lt. cycle oil, 30.5° A.P.I.	...	35.00
Hvy. cycle oil, 24° A.P.I.	...	13.00
Butane-butylene	...	8.00
Propane-propylene	...	4.00
Dry gas	2.1	...
Coke	4.2	...



SETUP.—Automotive-type drive shafts, splined compensation joint, with universals at each end. Speed of fan is controlled by V-belt sheaves on drive and fan shafts.



RADIATORS.—Installation at Signal's booster station at Huntington Beach, Calif., where fans are driven directly through connections flanged to flywheel of gas engines.

Novel Fan Drive

Radiators are mounted on steel bases outside the engine room, directly in line with hub flywheel of compressors

THE cooling system for gas engines in the recently expanded booster station of Signal Oil & Gas Co. at Huntington Beach, Calif., contains a novel fan drive.

The radiator units are mounted on structural-steel bases and set on a concrete pad outside the engine room directly in line with the hub of the flywheel of the compressors. Therefore, each individual engine is supplied with individual cooling and no water connections tie into other engines with the individual radiator of a unit.

Power to drive the radiator fans is supplied by the engines themselves through conventional automotive-type propeller shafts.

The hub of the flywheel and the end of the crankshaft are supplied with an additional fitting bolted on with capscrews to contain a stub shaft similar to the drive pinion shaft of a truck differential.

Keyed directly to this shaft is the usual type of flanged fitting to which one side of a universal joint is attached.

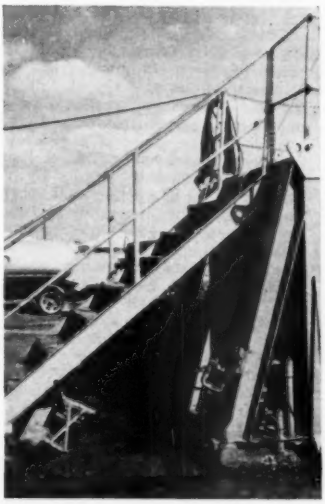
Drive shaft.—The main drive shaft is a tube having splined insides at the opposite end. In this is the connecting shaft of the second universal joint, which is attached with fittings to be connected to the driving sheave coupling and with flexible belting to the driving sheave on the radiator fan shaft itself.

The driving sheave shaft is mounted on two self-aligning pillow blocks bolted directly to a flat base which is carried on a stand supported by pipe set in the concrete pad.

Base support.—Slotted openings in the base-support stand provides means of drive-belt adjustment, and the universal joints in the propeller shaft compensates for angular direction so that loosening or tightening the belt will not interfere with power transmission from the engine to the fan drive itself.

The fan shaft is also mounted on two self-aligning pillow blocks, one on the radiator frame, and the other on the supporting member carrying the fan-drive sheave.

FAN DRIVE, showing connections flanged to end of crankshaft outside flywheel of gas engines driving the compressors.



Handy Stairway

This handy stairway on a rig of Santa Fe Drilling Co. is easy to install, and can be detached for easy moving. Lugs fitted at each of the four top corners of the skid platform (see upper right) serve as a means of attaching slings for loading or unloading with a crane.

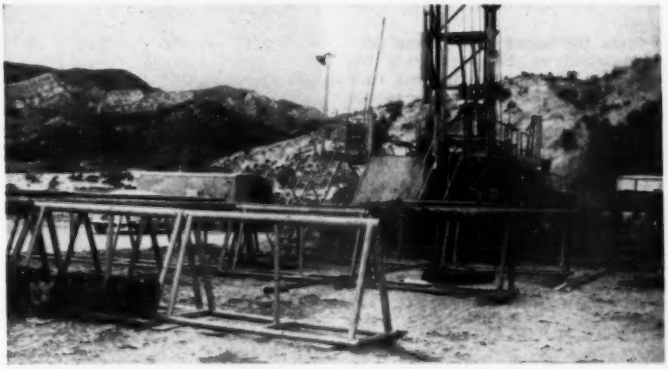
Diethylene Glycol Used in Pipe-Line Dust Scrubbers

Engineers of Mountain Fuel Supply Co. are using diethylene glycol as scrubbing liquid in dust-removal units on the main pipe line near Salt Lake City.

New scrubbers were installed at Salt Lake Border station in 1949, with

initial operations conducted using conventional petroleum-base scrubber oil. However, scrubbers soon flooded due to absorption of hydrocarbons from throughput gas. The resulting carry-over of liquid caused considerable operating trouble.

In April 1950, oil was discarded in favor of diethylene glycol. Use of this material over the ensuing 2-year period has proved satisfactory. Trouble-free operation has resulted, with very little makeup-glycol requirements.



EASY TO MOVE.—This lightweight pipe rack, constructed of common line pipe, is used by Ben Owens, drilling contractor currently operating in Castaic Junction field of California.

Light-Weight Pipe Rack

Developed by Ben Owens, drilling contractor, this rack supports pipe, plus walkway, and is easy to assemble

A LIGHT-WEIGHT rack for pipe and casing which also supports the walkway has been developed by Ben Owens, drilling contractor specializing in medium-depth holes where a mast-type rig is used.

Supports for the walkway are stepped down below the level of the pipe-rack sections so that the walkway will hold on a plane with the top of the horizontal members on which the drill pipe and casing are stored.

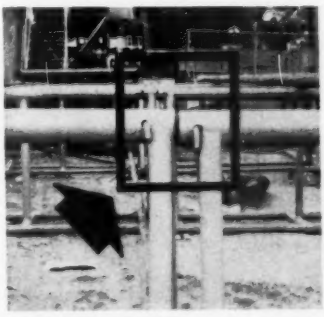
This is done by welding double ells to each end of the walk cross sill to bring the outer ends of the support level with the walk. Not only does this method bring the pipe rack to the top of the walk, but the stepped-down method prevents the walk from skidding sideways under a load.

Supports.—Ground contact of the supports consists of two parallel joints of pipe separated and retained in position with crossmembers.

Vertical members welded to these parallel sills have their top ends attached to the single sill upon which the pipe and casing rest.

Sections are made in convenient lengths for easy handling, hauling, and assembly. They are connected to each other with inner sleeves containing matching holes, through which retaining pins or bolts are inserted.

STEP-DOWN in pipe rack supports walkway, which is kept level with support members.



CONNECTING additional sections is done by inserting bolts in matching holes on sleeves.

SIMPLE BUT HANDY.—Shell Oil Co.'s "mail-box" type rag container installed at head of tank-battery stairway for convenience of gager.

Shell Uses "Mail-Box" Type Container For Clean Rags

Clean rags for use by gagers when checking quantities or obtaining samples from tanks in the field are kept in a simple but efficient "mail box" type of container attached to the hand rail at the head of the tank-battery stairway at Ventura, Calif.

The box is made by shaping a piece of light metal in a Quonset roof with the lower edges tack-welded to a sheet-metal floor. The back end is closed with a welded end but the front end is open.

Box is attached to the rail with stove bolts while the closed end, extending away from the hand rail, is supported by a light-weight angle-iron brace.

Thus clean rags are always handy for the gager, and all soiled cloths are removed from the area and stored in containers outside the tank-battery area.

Smoother Flow

Liquid buildup in cooling-coil outlet headers eliminated by use of a new header arrangement at Phillips' plant

LIQUID buildup in cooling-coil outlet headers is eliminated by using a new header arrangement. As a result, a more even flow of gas and liquid into accumulators is obtained.

This apparatus was developed by C. Glynn Mitchell, engineer, for Phillips Petroleum Co., at Odessa, Tex.

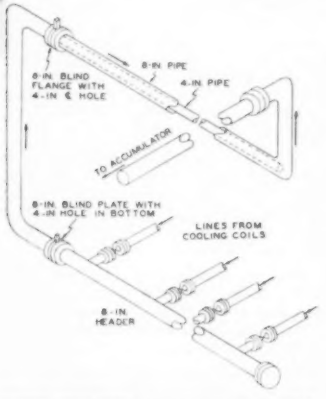
Mitchell used the idea as his entry in the "Operating Kinks" competition at the recent Permian basin regional meeting of Natural Gasoline Association of America at Odessa. He was awarded first prize in the processing division.

Unusual aspects.—There are two unusual aspects to the arrangement used by Mitchell. First, an 8-in. blind flange, with a 4-in. hole in the bottom is installed in an 8-in. header, just after the entry points of the lines coming directly from cooling coils. Line velocity is increased thereby, and liquid buildup is prevented.

A few feet before any vertical rise in the 8-in. header a blind flange with a centered 4-in. hole is installed. A length of 4-in. pipe, extending to within a few inches of the vertical riser, is inserted in the 8-in. pipe and welded to the flange. Thus line velocity at the riser is sufficiently high to prevent liquid buildup.

Eliminates trapping.—Application of this device eliminated the liquid trapping in a deethanizer coil outlet header line to the overhead accumulator. Previous to this installation, liquid collected in the header and carried over into the accumulator in slugs.

Since the liquid level in the fractionator accumulator controls the steam to the kettle element, any sudden variation of the accumulator level upsets the operation of the fractionator. After the liquid slugs were eliminated, the fractionator operation smoothed out. An additional 2,000 to 5,000 bbl. per day of deethanized product are obtained and a sharper cut is made in the separation of components.



NEW HEADER arrangement at Phillips Petroleum Co.'s Odessa, Tex., plant.

Navy Research Points Way to Better Control Tank Fires

Navy research on oil-tank fires may point the way to better methods of fighting them.

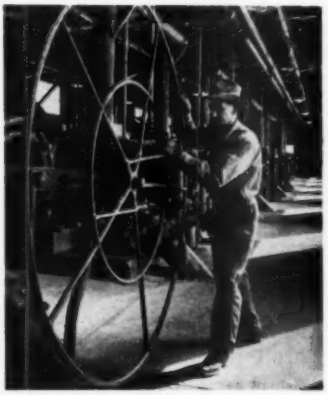
One of the methods investigated was developed by the British during the bombing of London and calls for the pumping of extinguishing materials into a burning tank through the oil-inflow pipe to put out fires on the top of the tank.

This technique uses the best protected piping around an oil tank to get the extinguishing medium to the fire, and wartime experience showed that the material could almost always be pumped to the fire in this way whereas the conventional fire-fighting equipment, located outside the tank, was usually damaged and put out of operation by the tank fire.

In the course of investigating this subsurface-injection technique Navy scientists explored the scientific principles involved in extinguishing oil fires by use of mechanically-formed foams.

Besides this knowledge of the scientific principles involved, the research program has resulted in development of practical methods for measuring and comparing the effectiveness of different materials and procedures, and better generators of oil-fire extinguishing foams.

The results of the work are described in a 92-page Naval Research Laboratory report on "A Study of Some Mechanical Foams and Their Use for Extinguishing Tank Fires" which has been published as "PB 103 775" by the Office of Technical Services of the Department of Commerce, Washington, D. C. Copies may be secured at $2.50 each.



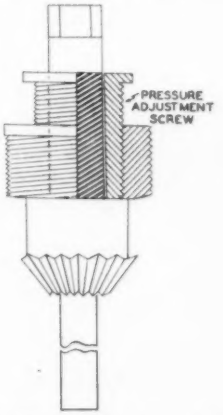
Hard Work Made Easy

Lonnie Cantrell, roustabout for Union Oil Co., figured there was an easier way to remove, install, and adjust pistons and rods in large gas compressors, so he designed this attachment, which gains a secure hold on the piston head. The large wheel-wrench does the turning, saving much time and labor. Formerly repairmen had been getting at the threaded piston rod through a small opening in the compressor housing.

Valve Seat Refacing Tool Is Giving Good Results

A plant-built valve-seat refacing tool, devised for air-injection valves on compressors has been giving good results, according to Sinclair Refining Co., Houston.

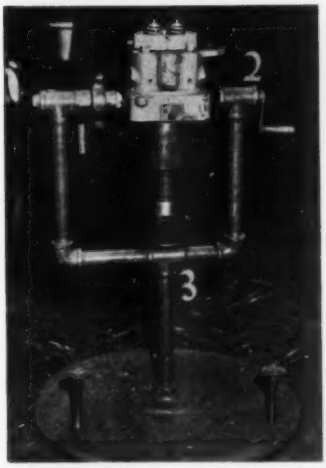
The tool consists of a standard reamer mounted on a stem which is



SINCLAIR'S plant-built valve-seat refacing tool.

held in the plug opening on the compressor by a threaded bushing.

Pressure is applied to the reamer with an externally threaded bushing. Rotary motion to the reamer is applied in the usual manner by using a wrench on the hex head of the special stem.



SUNRAY'S overhaul jig used to service cylinders of C.F.R. octane-testing engines.

Overhaul Jig

It is highly adaptable, Sunray Pipeline reports

A JIG which is easily constructed of 1-in. pipe and fittings can be used to good advantage in overhauling the cylinder of C.F.R. octane-testing engines.

The jig shown in the accompanying photo was designed by Nels J. Kirk, in charge of the Sunray Pipeline Co. tank farm and terminal at Drumright, Okla.

The male section of a wing union is welded to the No. 1 tee. A ½-in. length of a ⅝-in. Allen set-screw wrench is cut off and welded to a pipe bushing which is threaded to the female section of the union. The No. 2 tee has two bushings in it through which a ⅝-in. by 5-in. bolt, provided with a crank handle, is threaded.

The Allen wrench on the left and the threaded bolt on the right fit into the recessed cleanout plugs of the C.F.R. cylinder. The wing union is tightened to hold the cylinder rigidly while valve springs and valves are removed. The union is then loosened while the cylinder is turned over for grinding of the valve seats. In turning over, the cylinder is pivoted on the threaded bolts and the wing union.

Steel base.—An 18-in. or 20-in. diameter steel or cast-iron plate forms the base of the jig. This is provided with three leveling screws made of ⅝-in. bolt, to which small valve wheels are welded. Leveling is important. The cylinder should be perfectly vertical before grinding of seats begins.

If the cylinder is perfectly level a true seat, as checked by the runout gage, can be obtained faster with less work.

The disk which can be seen above the No. 3 tee (⅛-in. thick by 4-in. diameter) acts as a small auxiliary table. It is welded to a ½ in. by 6 in. threaded rod working through a ½-in. hex nut welded into the upper end of the vertical pipe that threads into the No. 3 tee.

Covers for Packing-Gland Area Made of Sheet Metal

Covers or splash plates for packing glands on centrifugal pumps have been made out of light sheet metal and equipped with straps to retain them in position at Indiana Farm Bureau Association, Inc.'s., Mount Vernon, Ind., refinery.

The plates are made in the form of "scoops," with both sides an one end closed, tapering down to the open end.

These are "tailored" for the individual pump and for the side, right or left, to which they are attached. Retaining straps are made of plumber's tape riveted to one end of the scoop and bent at the other end to spring tightly over the web in the casting above the packing glands.

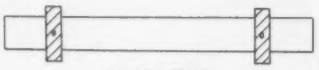
Plumber's tape was used because it has only a slight spring, but sufficient enough to retain the scoop in position.

HANDY COVER.—This cover, made of sheet metal, protects packing glands on centrifugal pumps.

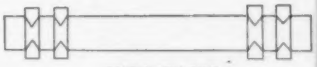
Double-Seal Gasket Cuts Downtime of Compressors

A double-seal main-bearing-joint gasket is being used on compressors to provide an effective oil seal and reduce shutdown time for repairs, due to blown gaskets, by Humble Oil & Refining Co.

Previously the gasket consisted of steel strips with a traverse bead of soft metal at each end. As bearing is tightened these beads are deformed and extruded out to meet shaft journal.



OLD TYPE SEALS



DOUBLE SEAL TYPE

In this manner lubricating oil is sealed in the bearing and pressure is not lost due to leakage at this point.

These gaskets eventually blow out because oil pressure acts at all times against the axis of the seal. After three or four seals in the engine have failed in this manner, the large amount of oil leakage necessitates shutdown for repairs to the engine.

The new gasket adds an additional bead at each end of the steel strip. The strip is V-notched on either side at the location of supplementary bead, and solder is poured at these points where it bonds together through the notches.

The factory method employs a ⅛-in. hole to allow the soft metal to weld together.

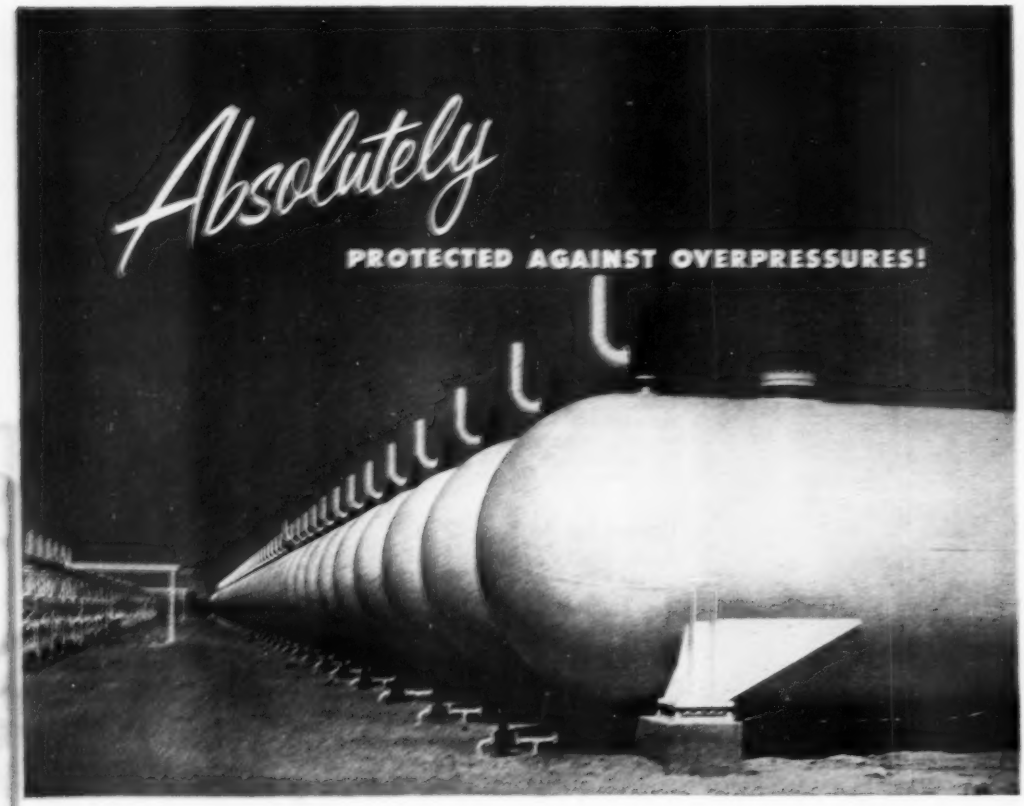
The proposed method is felt to be superior in that a greater shear area is provided and use of two seals at each end instead of one, in effect, doubles the life of the gasket.

Idea Brings $2,863 in Cash To Socony-Vacuum Refiner

A method for preventing the loss of bead catalyst used in refining of petroleum products has brought a cash award of $2,863 to Peter G. Kercher, foreman in the welding department of Socony-Vacuum Oil Co., Inc.'s, refinery at Casper, Wyo.

This is the largest award yet made to an employe under the suggestion system.

Until Kercher's suggestion was made, other ideas tried had proven unsuccessful.



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THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

No. 1

PUMPS:

Part 1—The Pump and the Pumping System

by Gerald L. Farrar
Engineering Editor

ANY pump installation consists of the pump itself and the system in which it is to operate. The system is characterized by certain conditions of flow and corresponding pressures. These factors vary markedly from installation to installation, and sometimes within the installation itself. The pump is the instrument by which the flow is brought about, and its **performance may be changed considerably** by moving from one system to another of different characteristics.

Head.—All liquid pressure can be thought of as generated by a column of liquid of height sufficient by its weight to produce the pressure in question. In pumping practice, pressures are almost always expressed in feet of liquid, or "liquid head." This term is defined by the expression:

$$\text{Liquid head, ft.} = \frac{(2.31)\ (\text{psia})}{\text{sp. gr.}}$$

The pressure term, psia. (pounds per square inch absolute), is determined from a gage or manometer at whatever point the head is desired. The value for atmospheric pressure must be added to the gage pressure to obtain absolute pressure.

The desired pressure may be the "suction head" on the input side of the pump, or it may be the "discharge head" on the outlet side of the pump.

Suction head.—Total suction head, h_s, is the pressure head at pump suction. It is evaluated as the static suction head, S, plus pressure head on the surface of the liquid in the supply tank, P_s, minus head loss due to flow friction, h_{fs}. The significance of these terms is illustrated graphically in Fig. 1, a schematic diagram of a typical pump installation.

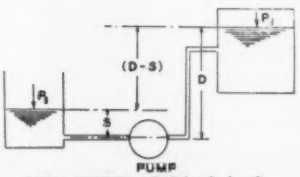

Fig. 1—Pump and system.

The flow friction term is a function of flow rate, and increases sharply as flow increases. Since the other terms usually remain constant, total suction head increases as the volume pumped increases in a given system.

Suction lift.—Negative suction head is termed "suction lift." For a liquid which has low or negligible vapor pressure, the theoretical allowable suction lift is equal to the atmospheric-pressure head minus the vapor-pressure head of the liquid. If this value is exceeded, the pressure at the pump suction is less than the vapor pressure, and the fluid to be pumped is in the gas phase. As a consequence, no pumping results.

For a liquid which has a vapor pressure in excess of atmospheric pressure the term, suction lift, loses its meaning in any practical case. A volatile liquid is usually stored at its vapor pressure. Thus the existence of any suction lift at all means the pump suction pressure is less than the vapor pressure of the liquid.

In any case the actual suction-lift allowable is somewhat less than the theoretical value obtained as described above. It is highly desirable to operate pumps in any installation with a suction head wherever possible.

Discharge head.—Total discharge head, h_d, is defined as the static discharge head, D, plus the pressure head, P_d, on the surface of the liquid in the discharge reservoir, plus the head loss due to flow friction, h_{fd}, in the discharge lines.

The total operating head, H, is then defined as total discharge head minus the suction head. This is the pressure head which must be generated by the pump.

Power for pumping.—The work required to lift a liquid or to move it against gravity follows directly from the basic definition of work: force times distance. In this definition, the force corresponds to the mass of liquid and the distance is the liquid head, either vertical or equivalent due to friction losses, etc.

Work, ft.-lb.

= (weight, lb.) (head, ft.)

The pump may actually raise the liquid, or it may force it into a pressure vessel or merely give it enough head to overcome friction. All forms of energy imparted to the liquid must be accounted for in determining the work done.

At any rate, the work term in the above equation is the useful work done. Since no operation is 100 per cent efficient, a greater amount of work must be applied to the pump to obtain the required useful work. The over-all efficiency, E, of a pump is defined as the ratio of work done by the pump to the work supplied to the pump. The following equations apply for determining required

work input to the pump. Work is expressed in terms of power units:

$$W = \frac{(\text{lb./min.})\ (H)}{(33{,}000)\ (E)}$$

$$= \frac{(\text{bbl./hr.})\ (H)\ (\text{sp. gr.})}{(5{,}660)\ (E)}$$

Use of these equations is shown in Example 1.

Example 1.—One hundred barrels per hour of normal butane is supplied to a butane isomerization unit by means of a centrifugal pump. The normal butane is stored as a liquid under its vapor pressure at 100° F. Level of liquid in storage vessel is maintained 3 ft. above the pump center line. The butane enters the isomerizer at a height of 50 ft. above the pump center line, at a pressure of 150 psig. Line pressure drop from storage to isomerizer is 5 psi. Five bbl. per hour of pump discharge is throttled back to suction, for control purposes.

What is the theoretical horsepower required by the pump? If power input measurements show 10 hp., what is over-all efficiency of pump and motor?

Solution:

1. Calculation of H.

Vapor pressure of n-butane = 52 psia. at 100° F.

Isomerizer pressure minus tank pressure = $P_d - P_s$ = (150 + 14.7) — 52 = 112.7 psi.

Liquid head = D — S = 50 — 3 = 47 ft.

Line drop = $h_{fs} + h_{fd}$ = 5 psi.

$$H = \frac{(112.7 + 5)\ (2.31)}{0.558} + 47$$

$$= 534 \text{ ft.}$$

2. Flow = 105 bbl. per hour.

3. Efficiency:

$$E = \frac{(105)\ (534)\ (0.558)}{(10)\ (5{,}660)}$$

$$= 55.2 \text{ per cent}$$

Part 2—Pumping Volatile Liquids

VOLATILE liquids are those which are at temperatures near their boiling points. Thus, a heavy oil under atmospheric pressure and high temperature must be treated as a volatile liquid. Such materials as propane and butane must necessarily be classified as volatile liquids under most processing conditions.

Vapor locking. — As previously mentioned, a positive suction head is required when dealing with volatile hydrocarbons. Otherwise the well-known problem of "vapor locking" is encountered. It is possible that vapor locking may occur when the liquid level is above the center line of the pump. In this instance the pressure drop between liquid storage area and the pump suction is too great and/or the temperature of the liquid at the pump suction is greater than the liquid temperature in the storage vessel.

There are several practical methods used to alleviate vapor locking without extensive rearrangement of equipment. Perhaps the simplest of these utilizes "steam fingers" in the storage vessels. The steam finger is a steam-heated vessel of small surface area. Its purpose is to raise the temperature of the liquid in the storage vessel by a few degrees, thus increasing the vapor pressure and consequently the pressure above the liquid in storage. There is a small temperature drop between the storage vessel and the pump, due to heat loss in the transfer lines. As a result, the pressure on the liquid at the pump is above the vapor pressure at that point, and there is no vapor generation.

Another method used to accomplish the same end involves the use of water coolers on the liquid feed line just before entry to the pump. The net effect is as described above, since there exists some temperature drop in the liquid as it moves from storage to the pump.

A third method involves a somewhat different approach. In this case the object is to reduce friction losses in the pump supply line to the greatest possible extent. Larger piping is installed, the number of fittings is reduced to an absolute minimum, and piping arrangement is made as simple and direct as possible. In this connection, it is nearly always good practice to install pipe one or two sizes larger than would otherwise be considered.

Size reduction at the pump should be accomplished by means of an eccentric reducer. If concentric reducer or conventional bushing is used, turbulence exists and bubbling occurs. These bubbles do not have time to return to the liquid phase before entering the pump. Too, the liquid is subjected to further turbulence at the impeller eye. The sum of these two effects can result in vapor locking. There is also danger of cavitation corrosion.

Allowable suction conditions.— Data on suction lifts and suction pressures are shown in Fig. 2. These curves show the allowable suction lift, or the required suction pressure for various types of pumps at various liquid vapor pressures. The data are based on atmospheric pressure of 14.7 psia.; at high altitudes the lifts must be reduced, and the suction pressures must be increased accordingly.

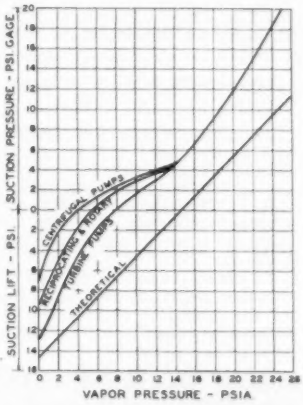

Fig. 2—Suction conditions. (By permission from Manual for Process Calculations, by Loyal Clark, Copyright 1947, McGraw-Hill Book Co., Inc.)

WINDOW ON THE FUTURE

A great new oil refinery with a projected capacity of 30,000,000 barrels a year is being erected by Anglo-Iranian on the coast of Kent, at a cost of some $112,000,000. The company's three existing refineries in the United Kingdom already have a combined annual capacity of over 44,000,000 barrels.

In many other countries the refineries operated by Anglo-Iranian and its associated companies are increasingly contributing to the world's supply of petroleum products.

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QUESTIONS ON TECHNOLOGY

by W. L. Nelson
Technical Editor

Pressure in Furnace Rather Than a Draft

We have a tube still in which the hot gases escape near the top even though there is a draft at the burners and also at the stack. What is wrong with the still?—S. P. A.

This is not an uncommon trouble with large box-type and down-convection-type stills such as the still shown in Fig. 1. Robert Reed of John Zink Co. *(The Oil and Gas Journal, March 11, 1943, p. 39)* discusses the reasons for such a behavior.

In general terms, the actual pressure within the still is always lowest at the stack or breeching connection and highest at the draft doors of the burner so that air enters at the burners and flue gas travels toward the stack. However, the atmospheric pressure of the air on the top of the still, for example just above the bridge wall, is very much lower than it is near the ground at the burners because air at 60° or 100° F. is very much more dense than the hot flue gases in the combustion chamber. Stated in another way, the combustion space itself acts as a chimney which tends to cause air to be sucked in at the burners and flue gas to escape through cracks in the top of the still.

As an example, consider a still (Fig. 1) in which the top of the still

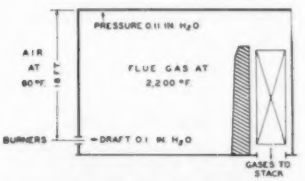

Fig. 1—Example of a still that is operating at a pressure in the top of the combustion space.

is 18 ft. above the center line of the burners. Air standing at 60° F. to a depth of 18 ft. above the burners exerts a pressure (above the atmospheric pressure at the top of the still) of:

$$\frac{28.9}{379} \times 18 \times \frac{12}{62.4}$$

$$= 0.264 \text{ in. of water}$$

in which 379 cu. ft. is the volume of 28.9 lb. (average molecular weight) of air at 60° F. at a total pressure of 14.7 psia., and 62.4 is the weight of 1 cu. ft. of water.

Meanwhile on the inside of the furnace cavity, the 18 ft. of 2,200° F. flue gas presses downward with a pressure (above the atmospheric pressure at the top of the still) of only:

$$\frac{30}{379} \times \frac{(460 + 60)}{(460 + 2{,}200)} \times 18$$

$$\times \frac{12}{62.4} = 0.054 \text{ in. water}$$

in which 30 is an average molecular weight of flue gas and 460 plus 60 or 2,200 are absolute temperatures.

Thus, a draft of at least 0.264 minus 0.054 or 0.21 in. of water tends to occur at the burners and even a larger draft if the stack produces a low pressure in the upper part of the still. If the stack produces a draft that is only 0.1 in. at the burner (a common burner draft) then a pressure (with respect to the outside of the still) is exerted at the top of the still in the amount of 0.21 minus 0.10 or 0.11 in. of water causing flue gas to leak out through any cracks and heating the refractory wall or structural steel of the still. Reed recommends that the draft at all points in the still should exceed 0.02 in. water, or that a pressure should never exist.

In the example just given, the situation could be remedied by opening the dampers at the stack (provided the stack is tall enough to provide more draft) and closing the dampers at the burners. This, however, must cause a draft exceeding 0.21 in. water across the burners before the pressure is relieved at the top of the still, and not all burners can be adjusted to operate properly at 0.2-0.3 in. draft.

Gravity of World Crude Oils

What gravities of crude oils are produced in Iran and how does the gravity compare with other competitive crude oils, such as those of Venezuela, Texas, etc.? Are all of the Iranian oils mixed base?—P. R. C.

Precise answers are difficult or impossible because the release of records is always slow and because the amounts cannot be accurately determined. Finally, so many crude oils are produced that all of them cannot be discussed. However, Fig. 1 shows the gravity distribution of Venezuelan, Californian, Mississippian, Middle East, and West Texas crude oils. East Texas oils are not shown because substantially the entire production falls in the short gravity range of 34°-40° A.P.I. Iranian crude oils range in gravity from 32° to 43° A.P.I. but data were not extensive enough to permit a separate curve for Iranian oils.

Recent crude-oil discoveries in West Texas consist mainly of crude oils lighter than 40° A.P.I., whereas discoveries in California have tended toward low-gravity crude oils. Venezuelan production has been increasing slightly in gravity until the average is now 24°-25° A.P.I. whereas that of California has decreased to about 26.5° A.P.I.

The crude-oil production of West Texas, Mississippi, East Texas, and the Middle East is all of intermediate base, even for crude oils that have gravities of only 12°-16° A.P.I. Venezuelan production during 1950 exhibited the following distribution with respect to base:

		Per cent
Naphthene Base		32.9
Mixed base		65.8
Intermediate naphthene	2.3	
Intermediate	60.2	
Intermediate paraffin	3.3	
Paraffin base		1.3
Total		100.0

Data with regard to California are not complete but it appears that the percentage of naphthene-base oils exceeds that of Venezuela by a small amount.

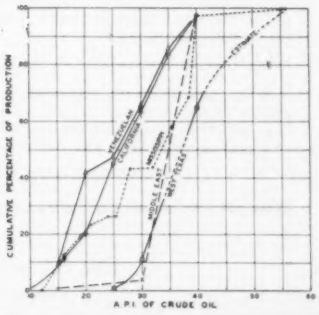

Fig. 1—Gravity distribution of world crude oils.

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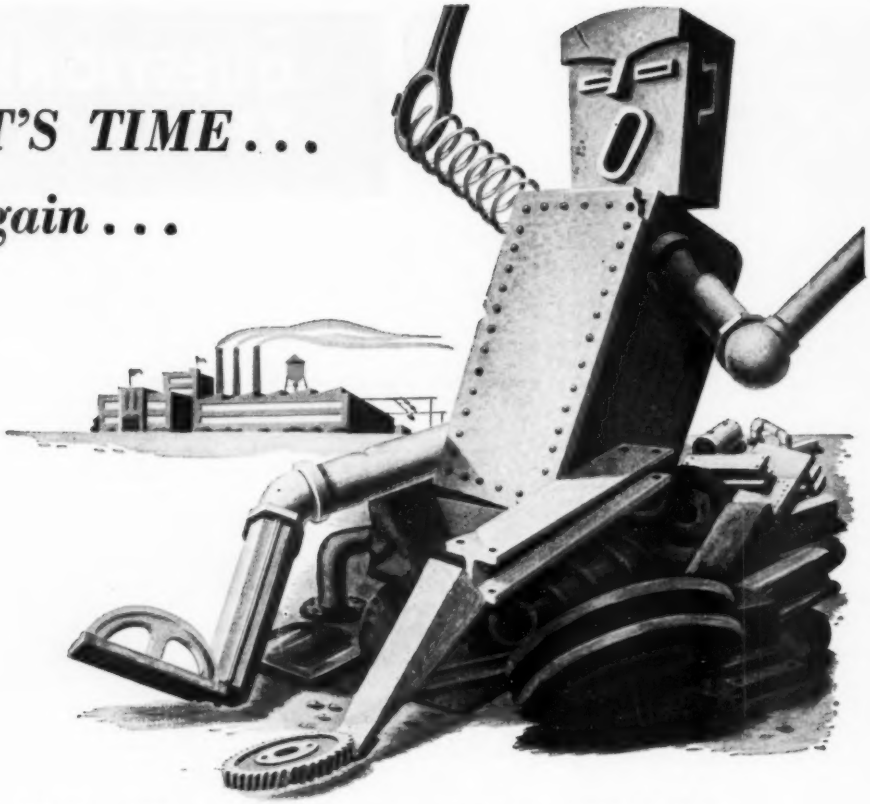
again . . .



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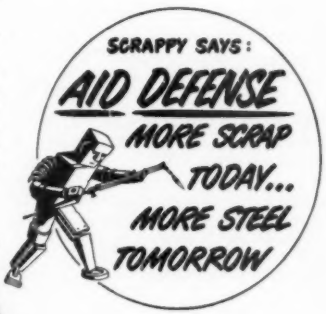

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CORROSION CONTROL

Corrosion of Subsurface Equipment in Producing Wells

THE outstanding characteristic of corrosive attack on the subsurface equipment in producing wells is its complexity, and the frequent surprises encountered. Almost overnight, the wells in an entire field, thought to be reasonably free from corrosion, will become a crucial problem. Criteria which served adequately in older fields will suddenly be proved unreliable. The industry has seen this happen at least twice — first with condensate wells, and more recently with high-pressure wells producing sweet crudes. Bacterial attack on the external surface of well casings has followed a similar pattern.

A well differs markedly from almost any other structure which may be subject to corrosion. It differs from a pipe line in the variety of its exposure, and in much greater inaccessibility. This difference in accessibility is not trivial—it means that data to indicate the progress of corrosion cannot be readily obtained, and it means that protection methods applicable to pipe lines are not usable. Cathodic protection, properly designed, should be able to cope with external attack on the outermost member of the string; but the nature of current distribution is such as to render it virtually useless for internal corrosion.

Inhibitors and Coatings

Internal corrosion on a pipe line may frequently be controlled by the continuous injection of a suitable modifying agent—which may take the form of a neutralizer, an inhibitor, or a preferential wetting agent. Application of a similar technique to a producing well involves at least two additional difficulties: first, the well is accessible at one end only, and there may or may not be a path through which the chemical can be injected; secondly, the agency responsible for the corrosion is more variable, both with respect to time and to well depth. Nevertheless, the use of inhibitors and other treatments has proved to be one of the valuable tools in combating well corrosion.

The arrangement, and the method of installation of the tubular goods in wells make the application of coating materials quite a different problem from similar applications to surface lines. Here again, however, considerable success has been experienced with such methods. Mill or factory application is the rule, and the coatings in use are thinner and, ordinarily, more expensive than those in use for the external protection of pipe lines.

High Cost of Failure

In another important and relevant respect, the steel structure in a well differs from other structures exposed to corrosion. In comparison with most, it is much more valuable per unit of exposed area; and failures are likely to be even more costly per occurrence. It is not a simple matter of repairing or replacing the one part which failed; it is a major operation to recover the part for repair. Often the final result may be the complete loss of the well as a whole. The significance of this disparity in value of the structure and in probable cost of a corrosion failure is that more expensive means of combating corrosion are fully justified. One example of this is the readiness with which special (and expensive) alloys for tubing, sucker rods, and other vulnerable components are adopted, once their superiority in a given set of conditions has been demonstrated.

It is by no means true that a standard method of coping with corrosion has been developed for pipe lines; nor does it seem likely that such will ever be the case. Nevertheless, an extremely workable set of techniques has been devised, some combination of which can be depended upon to control any particular instance of pipe line corrosion. It is also true that reasonable accuracy can be achieved in predicting the probable course of corrosion in different soils, and thereby in prescribing the combination of protective measures by means of which that control is to be effected. It is not necessary to state that this state of affairs does not hold for corrosion of subsurface equipment in producing wells. It is not possible to predict the degree or distribution of attack to be expected, except for later wells drilled in fields after sufficient experience has been accumulated on the first wells. Even then, conditions can change so as to upset predictions—and when this does not happen, there is still the problem of dealing with wells already in existence.

In fields whose behavior has been established, the problem of developing effective countermeasures is usually a new problem; rarely are the techniques from other fields transferable, and certainly there is no reliable set of simple measures from which a program may be easily chosen. Just as the attack is varied, so are the methods available for control.

Control Measures

Briefly, the available measures are as follows:

1. The injection of chemicals for conditioning of the corrosive fluid or surface treatment of the attacked metal; various alkaline substances for pH control, inhibitors, and preferential wetting agents.

2. The use of corrosion-resistant alloys, either for components or as platings and linings. Various nickel alloys have been used for sucker rods and tubing, and internally nickel-plated tubing has been employed.

3. Nonmetallic coating and/or lining materials. Plastic lined tubing has been widely adopted in corrosive wells.

4. Cathodic protection. Not, as presently developed, suitable for protecting internal surfaces (with a few exceptions); not as widely used for the mitigation of external casing attack as it should be.

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Current Itemized Construction Cost Indexes

THE indexes relative to 1946 of specific construction materials shown on this page (W. L. Nelson, technical editor, The Oil and Gas Journal) may be used to bring the many costs published in the Cost-imating Series (October 21, 1948, weekly through December 29, 1949) to current prices. Similar itemized indexes have been published quarterly in the first weekly issues of January, April, July, and October. The Nelson Refinery Construction Index also appears monthly.

The sources of the costs and references to complete indexes since 1930 appear in the itemized index page of January 7, 1952, page 91.

(Multiply the prices of Cost-imating series by these indexes)
Base: 1946 = 100

	1947	1948	1949	March 1950	June 1950	Sept. 1950	Dec. 1950	1950	Feb. 1951	May 1951	Aug. 1951	Nov. 1951	1951
Labor:													
Skilled construction	112.0	125.0	133.9	137.2	139.8	141.9	143.2	140.0	145.3	146.1	150.1	151.6	148.3
Common labor	115.0	131.0	140.4	143.9	147.9	150.9	152.4	148.1	154.2	155.7	158.5	159.3	156.8
Refinery construction	113.5	128.0	137.1	140.5	143.9	146.4	147.8	144.0	149.7	150.9	154.3	155.4	152.5
Refinery operation	109.0	126.0	132.9	‡131.9	†135.7	†135.7	†145.3	137.6	†145.0	149.7	147.5	148.3	148.8
							Nov. 1950						
Equipment or materials:													
Board insulation, 48-in.	112.5	125.0	125.1	124.9	129.2	133.6	136.5	129.8	. . .	136.5	136.5	136.4	136.5
Boiler tubes, 2-2¼-in.	115.0	†135.0	140.9	148.3	148.2	148.1	148.3	149.5	163.3	163.3	163.3	163.3	163.3
Brick and tile composite	114.0	137.0	131.4	132.8	133.6	137.3	145.2	137.1	147.0	147.1	147.2	146.0	146.4
Brick, common	110.5	127.0	133.1	133.5	136.7	141.8	144.1	138.2	147.1	147.1	147.3	147.4	147.2
Brick, fireclay	114.0	126.0	131.3	141.4	141.4	141.3	155.5	144.9	155.5	155.5	155.5	147.3	150.0
Building materials composite	135.5	153.0	145.8	146.3	152.4	165.5	163.8	155.4	172.0	171.8	167.9	169.4	170.0
Castings, gray iron	118.5	†139.5	†141.5	. . .	160.0	169.3	169.4	†160.0	†173.4	†174.4	174.7	175.5	174.5
Castings, pipe	129.0	†180.0	173.8	171.2	161.9	171.2		170.9	191.0	190.9	191.0	190.9	190.9
Cement	110.0	125.0	128.2	129.6	129.6	130.9	135.1	131.2	141.3	141.4	141.4	141.4	141.4
Compressor	114.0	128.0	130.0	117.0	117.0	125.9	125.9	118.8	138.1	138.1	138.1	138.1	138.1
Engines (composite)	109.0	120.0	115.5	113.2	113.2	120.5	123.2	117.9	137.1	137.1	137.1	137.1	137.1
Gas	111.0	122.0	117.0	115.0	115.0	129.2	134.6	121.8	134.6	134.6	134.6	134.6	134.6
Diesel	106.0	117.0	114.0	111.5	111.5	111.8	111.8	114.0	139.7	139.7	139.7	139.7	139.7
Exchangers	†115.0	†130.0	†133.0										
Instruments (composite)	113.0	120.0	123.1	123.1	123.8	133.8	133.8	127.8	142.4	142.4	142.4	142.4	142.3
Flow meter, mechanical	102.0	. . .	109.2	109.2	109.2	121.3	121.3	114.0	126.8	126.8	126.8	126.8	126.8
Flow meter, air control	. . .	. . .	132.4	132.4	132.4	146.8	146.8	138.5	157.6	157.6	157.6	157.6	157.6
Flow meter, remote	. . .	. . .	130.2	130.2	130.2	142.2	142.2	135.5	151.7	151.7	151.7	151.7	151.7
Potentiometer, 6-ft.	111.0	. . .	125.8	130.0	130.0	137.3	137.3	134.0	146.6	146.6	146.6	146.6	146.6
Potentiometer, air control	. . .	. . .	131.6	131.6	131.6	136.8	136.8	134.1	136.8	136.8	136.8	136.8	136.8
Pressure controller	. . .	. . .	130.2	130.2	130.2	146.2	146.2	135.6	153.3	153.3	153.3	153.3	153.3
Pressure gage	109.0	. . .	100.0	100.0	100.0	100.0	100.0	101.2	108.6	108.6	108.6	108.6	108.6
Thermometer recording	. . .	. . .	118.6	118.6	121.0	129.6	129.6	124.0	144.3	144.3	144.3	144.3	144.3
Control valve	117.0	. . .	129.8	129.8	129.8	143.1	143.1	133.3	155.5	155.5	155.5	155.5	155.5
Insulation, asbestos pipe	118.0	122.0	130.1	130.1	130.2	130.3	130.9	137.9	162.9	162.9	162.9	162.8	162.9
Lumber (composite)	155.0	175.0	160.1	165.9	180.9	207.8	193.9	183.5	201.7	201.2	192.2	193.6	197.0
Cypress, C grade	155.0	178.0	213.5	247.1	246.8	251.5	255.5	†251.0	255.5	255.5	255.5	255.4	255.5
Pine, Ponderosa, No. 3	140.0	176.0	159.0	158.8	173.5	199.0		180.5	214.0	218.9	206.8	197.9	209.7
Pine, yellow timbers	138.0	161.0	154.8	156.6	163.0	195.4	188.2	†173.0	191.3	189.4	187.2	188.8	188.9
Redwood, heart	134.0	†159.0	154.6	171.1	180.8	191.6	191.6	†181.0	191.5	191.5	191.6	191.5	191.5
Motors, electric	110.0	112.7	114.0	129.0	129.0	135.3	135.3	130.8	148.8	148.8	148.8	148.8	148.8
Paint and paint materials	137.0	135.0	127.5	115.9	116.2	123.1	124.9	119.8	138.4	138.1	133.3	138.7	136.9
Paint, inside, flat	133.5	137.0	147.0	142.7	142.4	151.5	151.9	146.5	162.3	163.2	163.1	163.5	163.0
Paint, outside	150.0	†156.0	157.0	146.3	146.2	146.8	147.7	147.0	159.6	161.0	161.0	161.3	160.6
Pipe, sewer	111.5	121.5	119.1	121.5	131.8	135.8	144.2	132.0	152.4	152.5	152.4	152.4	152.4
Pipe, black, ¾-in.	120.5	†148.0	152.2	158.8	158.8	159.0	158.8	159.7	169.6	169.6	169.7	169.6	169.7
Pumps (composite)	118.7	129.1	131.7	129.3	131.7	144.0	144.0	136.0	159.7	159.7	159.7	159.7	159.3
Centrifugal	109.0	120.0	118.0	119.0	123.7	133.7	133.7	129.1	136.2	136.2	136.2	136.2	136.2
Reciprocating	128.5	138.1	144.6	139.6	139.6	154.4	154.4	143.9	183.3	183.3	183.3	183.3	182.4
Sand	112.0	122.0	127.4	127.8	128.7	135.9	132.1	129.3	137.6	138.0	138.0	137.9	138.0
Steel (composite iron and steel	121.0	140.5	150.2	153.0	153.4	156.0	157.7	155.2	168.2	168.5	168.5	168.7	168.5
Plate (tank)	117.5	†144.0	144.5	150.9	150.9	151.1	150.9	151.7	161.0	161.0	161.0	161.0	161.0
Sheet, galvanized	105.0	†146.0	139.0	142.1	150.9	154.8	156.1	150.9	165.6	165.6	165.6	169.1	166.1
Structural	113.5	†145.0	151.3	161.8	161.8	161.7	161.8	162.7	172.5	172.5	172.6	172.5	172.6
Transformers	116.0	116.0	116.0	116.0	98.7	123.4	123.4	116.0	130.5	130.5	130.5	130.5	130.5
							Dec. 1950						
Marshall-Stevens equipment (only) indexes:													
Process industries (average)	121.0	131.5	131.5	130.9	133.0	137.3	142.2	135.8	145.9	145.1	145.1	144.5	144.9
Chemical	119.5	130.0	130.0	129.2	131.0	135.2	140.0	133.8	143.4	142.8	142.8	142.2	142.5
Petroleum	121.0	132.0	132.0	131.4	133.6	138.0	143.0	136.5	146.7	145.9	145.9	145.3	145.6
Electrical power	122.0	135.0	135.0	134.4	136.5	140.8	145.7	139.3	149.4	148.7	148.7	148.0	148.3
Refrigeration	129.0	141.0	139.9	138.3	142.7	151.8	155.8	147.3	159.9	159.5	159.5	159.2	159.2
Steam power	122.0	132.0	132.0	131.2	133.4	138.0	143.7	136.6	147.6	146.8	146.8	146.1	146.5
Nelson—Refinery Construction	117.0	132.5	139.6	142.6	145.1	149.1	153.4	146.2	155.6	156.3	158.1	158.9	157.2

*The reference for all codes, or for composite, is "Wholesale Prices" published monthly by the Bureau of Labor Statistics, U. S. Department of Labor. †Estimate. ‡Revised.

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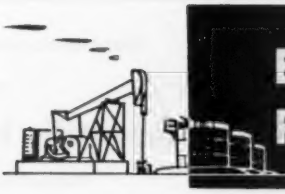


ENGINEERING FUNDAMENTALS

Adjustable Siphon on Wash Tank

Starting with this installment, valuable, time-saving operating ideas, direct from the field, will from time to time be presented on this page. The series by Dr. J. C. Calhoun will be presented, but will be interspersed with these other features which are designed to bring practical, usable information to the operator on the job.

WHEN a wash tank or other vessel is to be operated with a variable water level, the height of the liquid can be controlled with an adjustable siphon operated from the ground. An example of this type of control is found at Ventura, Calif., in Ventura Avenue field, on a Shell Oil Co. lease.

A number of full-swing fittings are placed in the top of the siphon, where the adjustment is attached in the usual manner for water-height control.

Two vertical joints of pipe parallel each other. One is on the water drain fitting at the base of the tank. This carries discard from the tank as it builds up in the normal course of oil treating. The top of this joint is fitted with a full swing consisting of two ells and a connecting nipple. The outlet of the last fitting is attached to a short piece of pipe joint, which in turn is connected to a similar section leading downward (see Fig. 1). This section is attached to a second vertical joint leading to the lease waste-water system.

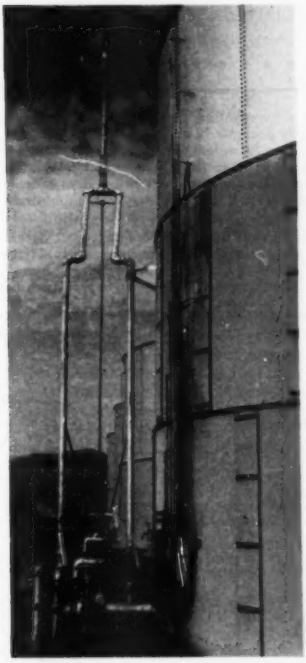


Fig. 1—Adjustable siphon is used to maintain level of water in wash tank. Double swing at "wishbone" allows for change in height, controlled with threaded shaft and nut with crank attachment for operating at ground level.

In the fittings which connect the harp-type connection at the top of both vertical joints of pipe is the usual vent line, installed to prevent pulling a vacuum on the water after flow has been established.

The top of the vent rises higher than the top deck of the wash tank. Here it is retained in a vertical position with a sleeve, carried on a horizontal brace, bolted to the top ring flange of the wash tank.

Adjustment of siphon height is made from the ground by means of a crank-operated shaft attached to a threaded bolt, as shown in Fig. 2. The bolt turns through a nut set into a frame at the height of a man's shoulder. The shaft, which actuates the adjustment of height of the siphon, leads from the crank to a connection at the top of the harp-type fittings where a bridge is welded between parallel pipes.

The crank is set below a cross tee bearing retained between two triangular pieces of tank steel. These steel pieces are welded to sucker-rod braces attached to the long vertical joint of pipe making up the principal part of the siphon. The nut through which the threaded bolt passes is welded to the lower end of the control shaft. The length of the threaded bolt is sufficient to adjust the water level from the lowest to the highest point anticipated under normal wash-tank operation.

The harp-type fitting, through which the water flows from the wash tank, is lowered by turning the crank in a counter clockwise direction. When turning the crank in a clockwise direction, the siphon is raised so that a greater amount of water is retained in the tank for treating purposes.

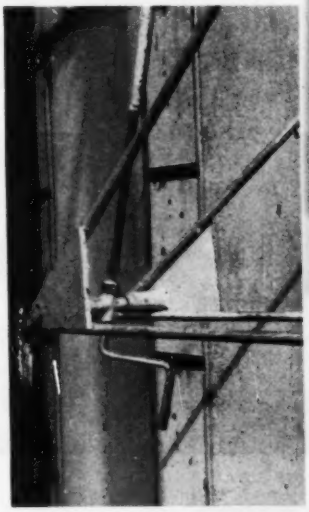
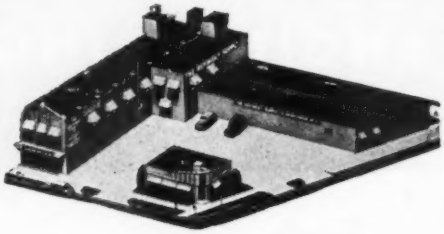


Fig. 2—Threaded shaft and nut are mounted on supporting bracket at convenient height for operator to change siphon for maintenance of a constant, predetermined level of water in wash tank.



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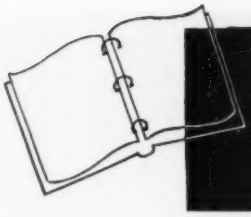


REFINER'S NOTEBOOK

No. 117

Sizing Discharge Piping for Relief-Valve Systems*

THE development of back-pressure relief valves has been reviewed in this series. Some of the latest work with back-pressure-valve designs will be taken up in future installments. One method for calculation of size of discharge piping is presented now. Other considerations and calculation methods involved in design of relief system piping will be taken up at a later date.

It is desirable from the standpoint of economy in piping to segregate the total number of valves into two groups with separate blowdown systems for high and low pressures. There still may be a valve or two in each group set at appreciably lower pressures than the rest. If this occurs, it is an economic advantage to permit back pressures to exceed the critical on these valves, making the necessary allowances for loss of capacity. Thus the size of relatively few valves may increase slightly, instead of enlarging the pipe size of the entire collecting system.

Maximum Discharge Quantity

Simple formulas can determine the mass relieved by any one valve under any set of emergency conditions. However, the total mass to be relieved by a collection header need not be thought of as the sum total of all the valves discharging into the system—particularly in a petroleum-refining unit.

Emergency conditions.—These may be developed by many causes: Operator error in closing the wrong valve; equipment failure, such as a reflux pump losing suction or breaking a shaft, or cooling water or other utility failure. It is improbable that all of the possible causes will happen simultaneously, so that a study must be made of all the conditions and a controlling case selected which produces the greatest quantity of vapors to be relieved. For example, if cooling water were to fail in the refinery, then all columns with water coolers or condensers would undoubtedly pop.

Maximum discharge quantity.—One way of arriving at a maximum discharge quantity for sizing the header is offered here for the reader's consideration. Take 50 per cent of the maximum discharge from all relief valves on columns with steam heaters or heat medium reboilers and 75 per cent of maximum discharge from all relief valves on columns with fired heaters and total. Quantities taken to size valves for vessels under fire conditions may be disregarded in this figure, but the total vapors that might be generated under a fire condition that would envelop the plant would have to be compared with the previous "failure of cooling water" quantity and if it is greater it would then be the controlling case.

In offering the above general rule it is understood that each plant presents its own special problems requiring individual judgment and solution.

Critical Back Pressure

It is necessary to determine the critical back pressure of each valve in the system in order to obtain design pressures for discharge piping at various points.

The formula (for flow through a nozzle) may be used:

$$P_t = P_1 \, [2/(k+1)]^{k/(k-1)}$$

(See, for example, "Piping Handbook" by Crocker.)

where:

P_t = critical back pressure, psia.
P_1 = accumulated relieving pressure, psia.
k = specific heat at constant pressure divided by specific heat at constant volume.

Maximum allowable back pressure.—This is the smallest value of these factors:

1. Outlet flange A.S.A. pressure, and temperature limits. The 150-lb. R.F. flange normally furnished is limited to 230 psig. at 100° F., or 150 psig. at 500° F. Heavier flanges and ring joint flanges are available for higher back pressures.

2. Maximum design pressure of bellows (if bellows valve is used).

3. Critical back pressure. Pressures exceeding the critical produce a loss of acoustic velocity at the nozzle throat and corresponding reduction in rate of capacity.

In the next installment of Refiner's Notebook examples in calculating required size of discharge piping will give the method of solution in more concrete terms.

For simplicity, examples will be given in terms of single valves. A header to handle the discharge of many safety-relief valves can be designed in the same manner, with due consideration to segregation of set pressures and the various causes of emergency conditions.

Having determined the required length of discharge piping, additional savings can be made by progressively increasing the pipe diameter on long runs and as additional valves enter the system.

Valve sizing.—Formula for nozzle safety-valve capacity for any gas or vapor:

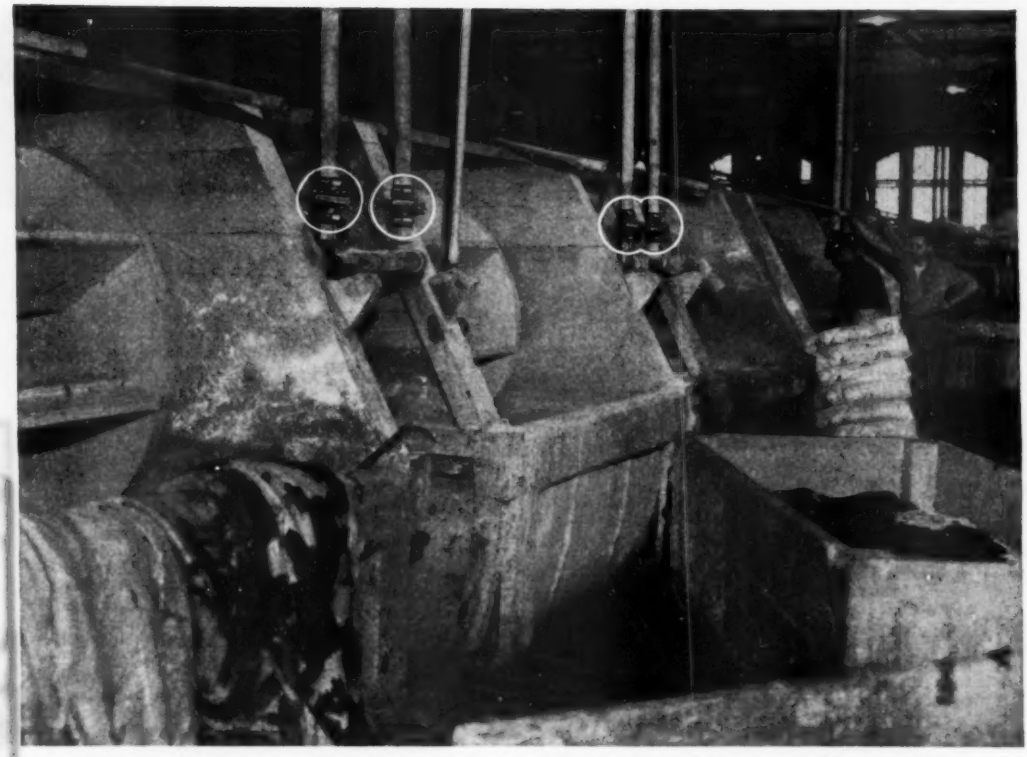
$$W = 0.9 \, CKAP \, (M/T)^{1/2}$$

where

W = flow of any gas or vapor, lb. per hour
C = constant for gas or vapor which is function of the ratio of specific heats, $k = C_p/C_v$
K = coefficient of discharge
A = orifice area, sq. in.
P = accumulated absolute upstream pressure, psia. = (set pressure × 1.10) plus atmospheric pressure
M = molecular weight
T = absolute inlet temperature, °R = °F. + 460

An additional safety factor of 90 per cent is required by the 1950 A.S.M.E. Boiler Construction Code, Section VIII, for Unfired Pressure Vessels. The above formula applies only when specific heats are known and back pressures do not exceed the critical. Supercompressibility factor "Z" may be included in formula as multiplier of T. This results in smaller valve size.

*Material from "Principles of Discharge Piping Application. . . .," Manual 51-B, Farris Engineering Corp., Palisades Park, N. J.



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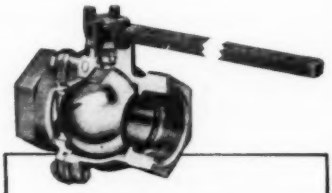

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Cities Service Pipe Line Co.—64 miles, 18-in., proposed, Sour Lake, Tex., to Lake Charles, La.

Continental Pipe Line Co.—105 miles, 8-in., authorized, Rincon to northwest of Sullivan City on to Port Isabel, Tex. Completion date 1952.

217 miles, 12-in., authorized, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

Gulf Refining Co.—80 miles, 24-in., proposed, Midland to Colorado City, Tex.

Humble Pipe Line Co.—4, 6, 8, 12-in., proposed, Upton and Reagan counties, Texas.

Interstate Oil Pipe Line Co.—33 miles, 20-in., authorized. Bunkie to Melville, La. Latex Const. of Georgia. Completion date 10-52.

68 miles, 16-in., authorized, Raceland to Anchorage, La. Completion date 10-52.

18 miles, 12-in., authorized, LaRose to Raceland, La. Completion date 10-52.

47 miles, 16-in., authorized, Sunset to Anchorage, La. Completion date 7-52.

Pan American Pipe Line Co.—27 miles, 26-in., planned, Genoa to Texas City, Tex. Completion date 12-52.

40 miles, 14-in., planned, Arden Station in Irion County to Eldorado Station in Schleicher County, Tex. 6-52.

Platte Pipe Line Co.—1,075 miles, 16, 20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

573 miles, 16-20-in., under way, Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co., contractor. A. A. Carrigan, spreadman at Scotts Bluff, Neb.

142 miles, 20-in., under way, Holdredge, Neb., to Kansas State Line, Fulton & Brodie, contractor, J. T. Brodie, spreadman.

Section 7. 274 miles, 20-in., Missouri River to Salisbury, Mo., and Section 8, Salisbury to Mississippi River, under way. O. R. Burden Construction Co. Al Perry, spreadman at Carrolton, Mo.; river crossing field office, Hartford, Ill., Dick Jernigan, spreadman.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

Rancho Pipe Line System.—455 miles, 24-in., authorized, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., Phillips Pipe Line Co., and Ashland Pipe Line Co. with Shell Pipe Line Corp. handling construction and operation.

267 miles, contracted, McCamey to Cedar Valley near Austin, Tex. Anderson Bros. Corp.

190 miles, 24-in., contracted, Austin to Shell's Deer Park Refinery (Houston area).

Roosevelt Oil & Refining Corp.—22 miles, 4 and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—28 miles, 30-in., looping, authorized; Drumright, Okla., to Humboldt, Kans. G. G. Griffis Const. Co., contractor. E. G. Grisham, spreadman at Drumright.

30 miles, 10-in., proposed, Lea County, New Mexico.

30 miles, 6-in., Knox and Haskell counties, Texas.

29 miles, 4, 6, 8-in., proposed, Natrona County, Wyoming.

Shell Pipe Line Corp.—42 miles, 8-in., authorized, Hallettsville to La Grange, Tex. Completion date 7-1-52.

66 miles, 8-in., authorized, Gohlke to La Grange, Tex. Company crews. Completion date 1952.

Sinclair Pipe Line Co.—674 miles, 22, 24-in., under way, Drumright, Okla., to East Chicago, Ind. Completion date 1952.

Section 1—150 miles, 24-in., under way, Drumright-Cushing, Okla., area, to Humboldt, Kans. O. R. Burden Construction Co.

(Spread 1) 60 miles, 24-in., under way, Caney to Humboldt, Kans. A. B. Haynes, supt., at Chanute, Kans.

(Spread 2) 90 miles, 24-in., under way, Cushing, Okla., to Caney, Kans. Floyd Lewis spreadman at Hominy, Okla.

184 miles, 24-in., under way, Humboldt, Kans., to Missouri. R. H. Fulton & Co., contractor, M. L. Boyd and Jerry Nash, spreadmen.

Sterling Pipe Line System.—53 miles, 12-in., authorized, Sterling, Colo., to connection with Platte Pipe Line at Gurley, Neb. (Includes 20 miles, 10-in., main line; 35 miles, 6-in., branch lines.) Joint venture comprising Toronto Pipe Line Co., Shell Pipe Line Corp., and Texas Pipe Line Co.

Sun Pipe Line Co.—99 miles, 4, 6, 8-in., proposed, Scurry County, Tex.

Texas Pipe Line Co.—319 miles, 22, 12, 10-in., under way, Louisiana Gulf Coast to Port Arthur, Tex., including 220 miles, 22-in., Houma, La., to Port Arthur, Tex.; 31 miles, 12¾-in., Houma to Cocodrie, La. Houston Contracting Corp. Completion date in summer 1952.

175 miles, 16-in., under way, Corsicana to East Houston. Smith Contracting Corp. Frank Craig, spreadman at Teague, Tex. Completion early summer.

319 miles, 22, 12, 10-in., under way, Louisiana Gulf Coast to Port Arthur, Tex. Houston Contracting Co.

220 miles, 22-in., under way, Houma, La., to Port Arthur, Tex. Houston Contracting Co.

67 miles, 22-in., under way, Holmwood, La., west to Port Arthur, Tex. Houston Contracting Co., E. C. Norris, superintendent at Lake Charles, La.

67 miles, 22-in., under way, Holmwood east to Gueydan, La., and from Morgan City east to Houma. Houston Contracting. W. H. Hayes, superintendent, at Jennings, La.

86 miles, 22-in., under way, Gueydan east to Morgan City, La. Houston Contracting. F. A. Silar, superintendent, at Abbeville, La.

65 miles, 6, 8, 10-in., under way, and 30 miles, 12-in., Houma, La., south through Terrebonne Bay vicinity. Houston Contracting. H. L. Leake, superintendent, at Houma.

West Texas Gulf Pipe Line Co.—471 miles, 26-in., contracted, Colorado City to Wortham, Tex., Wortham to Sour Lake, Tex., 34-in. Completion date 10-52.

114 miles, 20-in., contracted, Wortham to Longview, Tex. Completion date 10-52.

44 miles, 26-in., under way, Glenrose, Tex., area. Anderson Brothers, contractor

120 miles, 26-in., contracted, East of Abilene, Tex. Associated Pipe Line Contractors, Inc.

60 miles, 26-in., contracted, Colorado City to Abilene, Tex. Anderson Bros. Corp.

94 miles, 26-in., contracted, West of Wortham, Tex. Anderson Bros.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla. (Includes 114 miles, 8-in., 33 miles, 6-in.)

Buckeye Pipe Line Co.—370 miles, 8, 12, 16-in., authorized, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.). Completion of 16-in., 1952, balance 1953.

8 miles, 12-in., authorized, looping Samaria to Earhart, Mich.

15 miles, 12-in., authorized, looping Sylvania, Ohio southward.

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Coastal Products Pipe Line Co.—260 miles, 20-in., proposed, Houston to Baton Rouge

Ohio Oil Co.—255 miles, 8, 10-in., proposed, East St. Louis, Ill., to Indianapolis.

24 miles, 8-in., authorized, East St. Louis to Wood River, Ill.

Phillips Oil Co.—28 miles, 12-in., authorized. Sweeny to Freeport, Tex. Completion date 3-52.

Phillips Pipe Line Co.—42 miles, 16-in., under way, Green Ridge to Villa Ridge, Mo. Mid-States Const. Co. T. H. Edmonds, superintendent at Sedalia, Mo.

68 miles, 12¾-in., under way. Osawatomie westward to Wichita, Kans. Brown Lite Co. R. E. Carriker, spreadman at Osawatomie, Kans.

40 miles, 10-in., through Monteau, Cole, Osage, and Gasconade counties, Missouri. Trojan Const. Co. E. L. Maggard, spreadman at Linn, Mo.

Under way, Palos, Kans.-Harrisonville, Mo. Smith Contracting Corp.

74 miles, 8-in., under way, looping from Decatur, Ill., to East Chicago, Ind. Somerville Const. Co., contractor.

137 miles, 10-in., authorized, looping from Paola, Kans., to East St. Louis, Ill.

Pioneer Pipe Line Co.—(Continental Pipe Line Co. and Sinclair Pipe Line Co.). 310 miles, 8-in., proposed, Sinclair, Wyo., to Salt Lake City, Utah.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Shell Oil Co.—565 miles, 8-14-in., planned, Wood River via East Chicago to Detroit; 35 miles, 14-in. Completion date summer of 1952.

Sinclair Pipe Line Co.—10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in., Marcus Hook to Bayonne, N. J.; East Chicago to South Bend, Ind.

Standard Oil Co. (Ind.).—316 miles, 12-in., proposed, Sugar Creek refinery to Dubuque, Iowa.

122 miles, 8-in., under way, Neodesha, Kans., to Belton, Mo. Bills & Tuoth Construction Co., Carl Bills, superintendent, at Armory Building, Neodesha. Completion date 1952.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

Susquehanna Pipe Line Co.—123 miles, 6, 8-in., proposed, Fostoria to Randolph, Ohio.

United States Pipe Line Co.—1,000 miles, proposed, Gulf Coast via Memphis, Nashville, Tenn., Lexington, and Paducah, Ky., to Cincinnati, Ohio.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—140 miles, 24-26-in., under way, New Jersey to Connecticut River near New Haven. Williams Brothers, contractor. Completion date 8-1-52.

Allied Gas Co.—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

Arkansas-Missouri Power Co.—140 miles, 2-10-in. planned, Arkansas and Missouri.

Associated Natural Gas Co.—88 miles, authorized, Missouri.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

21 miles, 26-in., proposed, Franklin and Anderson counties, Kansas.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash, spreadman at Lamar, Colo.

16 miles, 4-in., Pueblo County to Fowler, Colo.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Cumberland & Allegheny Gas Co.—46 miles, 10-in., authorized, Mountain Lake Park, Md., to Preston County, West Virginia.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich. Mahoney Contracting Co., contractor. Ralph Bucher, spreadman at Midland.

East Tennessee Natural Gas Co.—172 miles, 22-in., authorized, Greenbrier to Oak Ridge, Tenn.

100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

El Paso Natural Gas Co.—133 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

36 miles, 24-in., proposed, looping from Kingman to Franconia, Ariz.

Equitable Gas Co.—17 miles, 16-in., under way, near Pittsburgh, H. L. Gentry Const. Co., contractor. Lavern Curtis, spreadman at Sewickley, Pa.

Georgia Gas Co.—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

Glacier Gas Co.—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Interstate Gas Co.—1,000 miles, 30-in., planned, Gulf Coast to North Kentucky.

Home Gas Co.—32 miles, proposed, Chemung and Broome counties, New York.

17 miles, 12-in., proposed, loops from Hancock to Sanford, N. Y.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., authorized, Washington County to Cedar Rapids, Iowa.

¾ to 6-in., under way, Davenport, Iowa, and Moline, Ill. C. E. Wilson Const. Co.

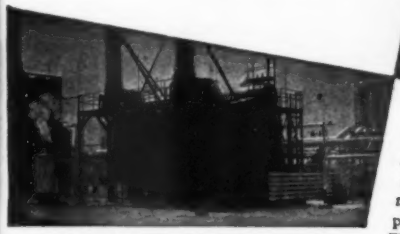
Kansas-Nebraska Natural Gas Co., Inc.—179 miles, proposed, Kansas and Nebraska.

40 miles, 6-in., under way. Albion to Norfolk, Neb. Jayhawk Const. Co., Inc., con-

WICKES

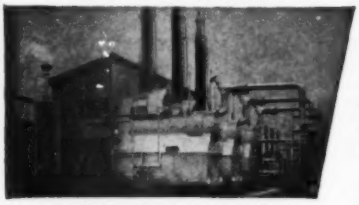
STEAM GENERATORS SPEED PROCESSING AND CUT COSTS IN REFINERIES AND NATURAL GASOLINE PLANTS

West Texas Natural Gasoline Plant

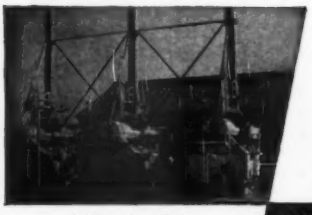


Central Texas Natural Gasoline Plant

The Wickes Type A Steam Generator is proving itself one of the most serviceable boiler units employed by the oil and gas industry. Wickes can fill your exact requirements for boilers of any type up to 250,000 lbs. steam per hour and 850 p.s.i. Wickes service facilities are world-wide and our knowledge of steam generation is available to you without obligation. Write for descriptive literature on the famous Wickes line of steam generators.



Louisiana Refinery



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134

tractor; F. A. Faler, spreadman at Albion.

30 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc. F. A. Faler, spreadman at Albion.

60 miles, 8, 10, 12-in., under way, Grand Island to Albion, Neb.

65 miles, 2-8-in., authorized, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb. 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension). Completion date 1952.

Kansas Power & Light Co.—27 miles, 20-in., authorized. Pratt, Kans., to Calista compressor station.

Lake Shore Pipe Line Co.—45 miles, 10¾-in., authorized, northwesterly from T.G.T. system near Meadville, Pa., to Ashtabula, Ohio.

Lone Star Gas Co.—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

Manufacturers Gas Light & Heat Co.—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

Michigan Gas Storage Co.—93 miles, 16, 22, 24-in., under way, Laingsburg to near Pontiac and Mount Clemens, Mich. (Includes 17 miles of lateral lines.) Mahoney Contractor. Completion date 6-52.

30 miles, 26-in., authorized, looping between Laingsburg and Mount Pleasant Junction, Mich.

Michigan Gas Utilities Co.—77 miles, under way, Sturgis, Hillsdale, and Coldwater, Mich. (22.7 miles, Marshall south to Coldwater; 20 miles, Coldwater easterly to Hillsdale; 22.5 miles, Hillsdale to Sturgis, 11 miles, Hillsdale to Jonesville.) Somerville Const., contractor. Jim Godwin at Coldwater.

MidSouth Gas Co.—240 miles, proposed, Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

Mississippi River Fuel Corp.—98 miles, 16- and 18-in., authorized, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

40 miles, 18-in., authorized, Dubach to Perryville, La.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

Montana Power Co.—52 miles, 16-in., authorized, Canada-Montana border to Cut Bank, Mont.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 8 miles west to Union City.)

Nevada Natural Gas Pipe Line Co.—114 miles, 10-in., proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—80 miles, planned, Summers to Monroe counties, West Virginia to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., authorized, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

12 miles, 20-in., under way, looping at Zelienople, Penn. Williams-Austin Co. Ralph Gaddy, supt. 5-15-52.

52 miles, 16-in., contracted, Utica to Amsterdam, N. Y. (to begin at completion of Zelienople). Williams Austin. Ralph Gaddy, supt. Completion in 90 days.

20 miles, 20-in., begin 5-1, Cayuta Gate to Ithaca, N. Y. Williams-Austin Co. Howard Bauer, supt. Completion date 6-30-52.

30 miles, 20-in., contracted, Angelica to Rossburg, N. Y. (begin at completion of Cayuta-Ithaca). Williams-Austin. Howard Bauer, supt. Completion in 45 days.

17 miles, 16-in., contracted, Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job). Williams-Austin. Howard Bauer, supt.

21 miles, Columbiana and Stark counties, Ohio.

Niagara Mohawk Power Corp.—55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt. Completion date 9-52.

Northeastern Gas Transmission Co.—221 miles, 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

Northern Indiana Fuel & Light Co.—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

373 miles, 24-in., proposed, Eastport, Idaho, to Monroe, Wash.

79 miles, 18-in., proposed, Monroe to International boundary near Lynden, Wash.

29 miles, 22-in., proposed, Monroe to near Seattle, Wash.

164 miles, 20-in., proposed, Seattle to Portland, Ore.

Ohio Fuel Gas Co.—31 miles, 20-in. authorized, Licking County to Richland County, Ohio.

22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in., authorized, Benton Station to Crawford Station. 18 miles, 20-in., Crawford Station to near Columbus. 16 miles, 16-in., authorized, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., authorized, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, authorized, northern and southwestern Ohio.

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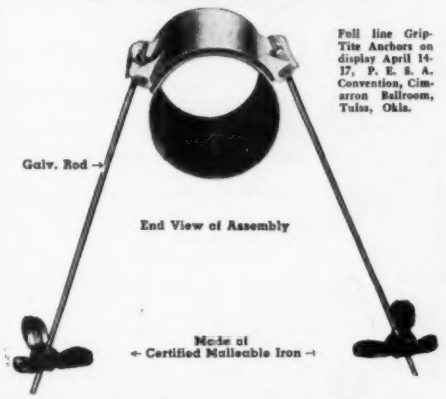

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33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

Oklahoma Natural Gas Co.—14 miles, 8⅝-in., under way, Shamrock to Cushing, Okla.; 21 miles, 24-in., under way, Depew to Kellyville, Okla. 9 miles, 12¾-in., Stroud to Depew, Okla. 26 miles, 12-in., under way, Ringwood to Enid, Okla. Trojan Const. Co. Charles Tillotson, spreadman at Enid.

Pacific Gas & Electric Co.—44 miles, 8-in. under way, Salinas to King City, Calif. W. A. Tyler, contractor. Completion date 1952.

141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville; 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Pacific Northwest Pipeline Corp.—26-in. Alberta fields through to Pincher Creek, Spokane, Hanford, Vancouver, and Portland.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvanian Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. Section 1—27 miles, under way and contracted by Harford Bros. Section 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex., J. F. Crawford, spreadman at Texhoma, Okla.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of Colorado.—95 miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

Public Service Co. of North Carolina.—33 miles, 10-in., authorized, Burlington to Chapel Hill, N. C.

16 miles, 8-in., authorized, Chapel Hill to Raleigh, N. C., completion date 7-1-52.

29 miles, 4-in., authorized, Statesville to Kanapolis, N. C., completion date 7-1-52.

83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C., completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

South Georgia Natural Gas Co.—339 miles, 2-12-in., proposed, Florida and Georgia.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of California.—45 miles, 30 in., proposed, looping on line from Arizona border to Los Angeles.

81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern Natural Gas Co.—21 miles, 24-in., authorized, Perryville Station La., to Boeuf River.

14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southern Union Gas Co.—21 miles, 20-in., authorized, Albuquerque, N. M.

27 miles, 10-in., authorized, Lea and Eddy counties, New Mexico.

30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant. Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—591 miles, 24-30-in., proposed, looping along present system (consisting of 323 miles of 30-in.; 167 miles of 26-in.; 101 miles of 24-in.)

420 miles, 30-in., Texas, Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.

101 miles, 26-in., Kentucky and Ohio.

304 miles, 24-in., proposed, Mercer, Pa., to Utica, N. Y.

250 miles, miscellaneous laterals.

Texas Eastern Transmission Corp.—791 miles, 30-in., under way, Kosciusko, Miss., to Connellsville, Pa.

Section 8, 77 miles, 30-in., under way, Portsmouth to Amesville, Ohio. Anderson Bros. Corp.

Section 9, 74 miles, 30-in., under way, Amesville to Ohio-West Virginia river crossing. Anderson Bros. Corp.

Section 10, 66 miles, 30-in., under way, Ohio River to Connellsville, Pa. Anderson Bros Corp.

Texas Gas Transmission Corp.—408 miles, 26-in., proposed, looping from Bastrop to Hardinsburg, Ky.

223 miles, 26-in., proposed, Bastrop, La., to Covington, Tenn.

47 miles, 26-in., proposed, northeastward from Covington.

49 miles, 26-in., proposed, northeastward from Kenton, Tenn.

45 miles, 26-in., proposed, northeastward from Calvert City, Ky.

25 miles, 26-in. proposed, northeastward from Slaughters, Ky.

19 miles, 26-in., proposed, southwestward from Jeffersontown, Ky.

35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

180 miles, 26-in., authorized, Acadia Parish to connection with existing facilities in Morehouse Parish.

195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

560 miles, 26-in., proposed, Louisiana and Kentucky.

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1. MAXIMUM EFFICIENCY—Round anodes corrode more uniformly, insuring longer life, longer protection, greater economy.
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6. AVAILABILITY—A large supply of STANDARD Anodes are carried in stock to insure immediate shipment.

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Standard Magnesium Corporation
TULSA, OKLAHOMA

Texas-Ohio Gas Co.—1,350 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

Union Oil Co. of California.—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor. Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—315 miles, 34-30-in., under way, Agua Dulce to near Goodrich, Tex. Oklahoma Contracting Co., contractor. Panama Shiflett, spreadman, El Campo, Tex.; Ray Law, spreadman, Victoria, Tex.

510 miles, 30 to 30-in., under way, Agua Dulce, Tex., to Monroe, La. River Const. Corp., contractor.

Spread 1, 51 miles, 30-in., from Pearl River north and south of Jackson, Miss. Red Tatom, superintendent at Jackson.

Spread 2, 45 miles, 30-in., McComb to Pearl River south of Jackson. Merle Tatom, superintendent at Hazelhurst.

Spread 3, 30 miles, 30-in., Kosciusko south toward Jackson. Jimmy Reed, superintendent at Kosciusko.

Spread 4, 29 miles, 12-in., Lafayette to Jeanerette, La. Roy Earnhart, spreadman at Jeanerette.

Spread 6 and 7, 97 miles, 20-24-26-in., under way, Houston to Dupont's Sabine River Works, Orange, Tex. Barney Hall, superintendent at Port Arthur.

Spread 6, 20 miles, 20-in., under way, Orange to Port Neches, Tex. (This spread to move on to Trinity River and work toward Houston.) Banty Traweek, spreadman.

Spread 7, 20-26-in., under way, Port Neches to Fannett, Tex. (This spread will continue on to Trinity River.) Borger Red McMenamy, spreadman.

134 miles, Sterlington compressor station near Monroe to Jackson, Miss.

23 miles, 8-12-16-in., South Louisiana facilities.

53 miles, 24-in., authorized, Texas.

30 miles, 16-in., authorized, Baldwin County, Alabama, southeasterly to Escambia County, Florida.

36 miles, proposed, offshore from Ingleside to near Refugio, Tex.

All contracted by River Const. Corp., a joint venture including Oklahoma Contracting Co.; J. Ray McDermott & Co., Inc., and Morrison-Knudson. Inspection by Brown & Root, Inc.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va

Western Kentucky Gas Co.—3 to 4-in., under way, additions to present system: Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta-Vancouver Oil Pipe Line Co.—(Brokaw, Dixon, McKee).—972 miles, 16-in. proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor.—90 miles, 12-in., under way, Genoa to Rho, near Milan, Italy. Soc. Ital Condotte Acqua Montubi, contractor. Completion date 7-31-52.

Creole Petroleum Corp.—143 miles, 26-in. under way, Ule (State of Zulia) to Amuay (State of Falcon) William Bros. Corp. Completion date March 1953.

25 miles, 24-in., authorized, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

Direccion General de Yacimientos Petroliferos Fiscales.—400 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Iraq Government.—135 miles, 12-in., proposed, from Iraq Petroleum Co. at Baija to

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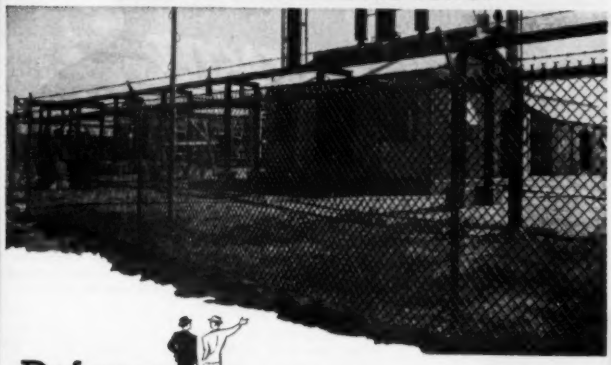

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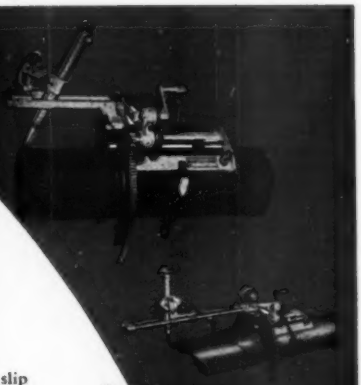

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You'll soon save several times the cost of the machine in labor, gas and transportation charges. H&M takes approximately one-half the labor and gas to make the cut as hand cutting and the work is all done in the field.

Bring this light (24 to 155 pounds) but durable machine to the pipe instead of moving the heavy pipe to the machine. Remember, H&M designs for SPEED and ECONOMY.

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Among many types of strap ends available are loop ends for use with pins or clevis bolts, slotted ends for eye bolts, T-Bolt ends for bolting directly in place, toggle ends for attachment to bolts or studs and straight ends for riveting or spot welding.

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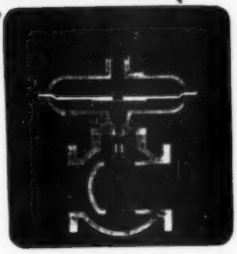

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Baghdad, Iraq. Construction 1952, M W Kellogg, contractor.

72 miles, 12¾-in., Zubair to Fao. Arabian Bechtel Co., contractor.

Kuwait Oil Co., Ltd.—10 miles, 20-in., authorized, third transit line Burgan-Ahmadi Completion date 2-53. 6 miles, 30-in., authorized, sixth gravity loading line, Ahmadi-Mina al Ahmadi. Completion date 6-53 5 miles, 16-20-in., authorized, Burgan field—oil collecting line. 2-52.

Middle East Pipelines, Ltd.—800 miles, 34-35-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Spitz & O'Berine.—264 miles, 24-in., under way, Capetown to Tarrytown, South Africa. J. C. Spitzexplari, spreadman at Capetown.

Texas Petroleum Co.—60 miles, 4-8-in., under way, Pto, Nino to La Dorada.

Trans-Mountain Oil Pipe Line Co.—639 miles, 24-in., proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

221 miles, 24-in., contracted, center section of line, Mannix, Ltd.

472 miles, 24-in., contracted, Western section of line, Comstock Midwestern, Ltd.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles 6-in., planned, Puerto Berrio to La Dorada Colombia.

113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil ((fuel oil line); Techint, contractor. Completion date 12-51.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—230 miles, 10-12-in., under way, Sarnia via London, Hamilton to Toronto, Ont., Canada. Comstock-Midwestern, Ltd., contractor. Completion date July 1952.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S.A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Societe des Transports Petroliers par Pipe Line.—140 miles, 10-in., under way, Le Havre to Paris, Fance. Entrepose, contractor. Completion date 1952.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar to Bogota, Colombia; Williams Brothers Co.; David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

145 miles, 14-16-in., under way, Cortemaggorie to Torino. Completion date 1951.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.

260 miles, 20-in., under way, Monterrey to Tampico and Poza Rica, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

Trans-Canada Pipe Lines, Ltd.—Proposed, Alberta to Toronto to Montreal.

Venezuela Atlantic Transmission Corp.—195 miles, 10-12-16-in., under way, El Placer near Las Mercedes, State of Guarico to Caracas, La Guaria, Maracay, and Valencia. Contracted by Williams Brothers, de Venezuela, S.A., B. E. Barnes, manager.

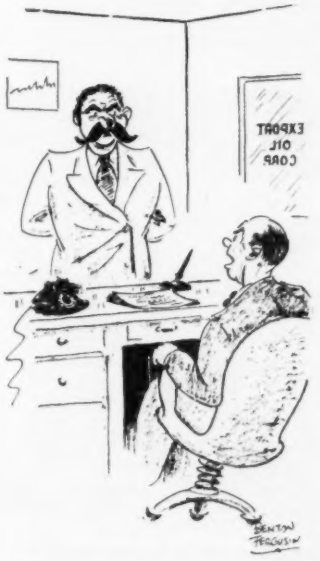
Westcoast Transmission Co., Ltd.—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

Western Pipe Lines.—1,033 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route to a point near the International boundary.



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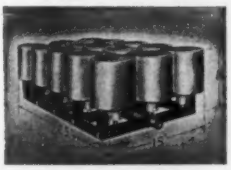

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PIPE LINES

Sinclair's Sinco-Port Arthur Products Line O.K.'d by PAD

TULSA.—The Petroleum Administration for Defense has approved construction by Sinclair Pipe Line Co. of a products line from Sinclair's refinery at Sinco., Tex., near Houston, to Port Arthur.

The diameter of the line has not been determined; it may be 8-in. or 12-in. The project probably will not be built before the latter part of this year or next year.

Texas Pipe Line Co. and Gulf Refining Co. interests have previously applied to PAD for approval of a products line from Port Arthur to a Baton Rouge, La., connection with the Plantation Pipe Line Co. system.

Ohio Completes Wood River To Lima, Ohio, Crude Line

FINDLAY, Ohio.—The last 117-mile section of Ohio Oil Co.'s new 355-mile crude-oil line between Wood River, Ill., and Lima, Ohio, has been completed, and the first crude has arrived at Lima.

O. F. Moore, manager of the company's pipe-line department, said completion of the final section marks the final stage of replacing and increasing capacity of its former crude-oil trunk which had been in operation for over 40 years.

Work on the new 20 and 22-in. line was begun in September 1950, and the portion between Wood River and Sheridan, Ind., has been in operation since June 1951.

The line is available to receive shipments at Wood River from all major lines which carry crude to the St. Louis area from the West, Southwest, and Rocky Mountain areas, Moore said. At Patoka, Ill., it can receive shipments from or make deliveries to other lines that junction in that area. Other delivery points are St. Elmo, Ill., Indianapolis, and Lima.

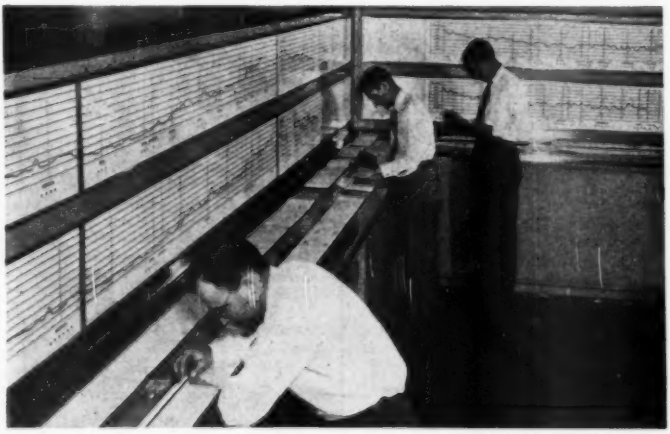
At Lima, the line connects with others carrying crude to points in Ohio, Michigan, Pennsylvania, New York, West Virginia, and Canada.

Interstate Lets Contract For Louisiana Crude Line

SHREVEPORT. — Interstate Oil Pipe Line Co. has let contract to Latex Construction Co. of Georgia for construction of 32 miles of 20-in. crude line between its pump stations at Bunkie and Melville, La.

The new line, on Interstate's Shreveport-Baton Rouge trunk line, will replace multiple 8-in. and double 12-in. lines now in service on this section.

The project is the third to be started by the company under its previously announced expansion and modernization program *(The Oil and Gas Journal, February 25, 1952, page 196)*. The program will involve expenditures of about $30,000,000 over the next 3 years. Construction of the



MASTER DISPATCHER.—Control of the flow of products through the huge Plantation Pipe Line Co. system is accomplished through use of this master dispatching board installed recently at Atlanta. Laid out on the board is a scale representation of the line with a series of markers accurately calibrated to represent pump stations and delivery terminals. The board enables the dispatcher to notify the distant stations swiftly by teletype as to when batch changes will arrive and when changes in operation will be necessary.

Bunkie-Melville line is slated to begin about the first of this month.

The second project, already under way, will replace the existing Bunkie pump station, built in 1909-10, with a new one of modern design. The station's capacity has been increased several times since then.

Other company projects, located mostly in Louisiana, involve projected expansions of its system in south and southwest Louisiana to provide needed increases in capacity of trunk lines serving producing areas in these regions.

Northern Natural Planning 400-Mile Line in Minnesota

WASHINGTON.—Northern Natural Gas Co., Omaha, has filed with the Federal Power Commission for approval of its proposal to lay a 400-mile 24-in. natural-gas line from the United States - Canadian border to near Minneapolis.

Northern would buy gas from Western Pipe Lines, a Canadian corporation, for about 27.8 cents per M.c.f. and transport it to the Midwest for resale to its present utility customers in Kansas, Nebraska, Iowa, Minnesota, and South Dakota.

The $24,590,000 project would carry an average of 120,000,000 cu. ft. of gas per day during the first year of operation, with throughput being increased later to a maximum of 250,000,000 cu. ft. daily. The program also involves construction of two compressor stations with a capacity of 5,280 hp. each.

The new line would originate near Emerson, Man., Canada, and extend south along the Red River Valley to Fergus Falls, Minn., thence southeast to a connection with Northern's existing system near Minneapolis.

Western Pipe Lines now is seeking authority from the Alberta Natural Gas Conservation Board to export gas from fields in southern Alberta to Saskatchewan, Manitoba, and the United States.

National Transit Buys Out South West Pennsylvania

OIL CITY, Pa.—National Transit Co., of this city, has purchased the system of South West Pennsylvania Pipe Lines, also of Oil City.

The system, composed of about 1,745 miles of 2 to 8-in. crude lines, changed hands for a price reported to be about $500,000.

J. H. Contino, president of National Transit, said properties acquired from South West Pennsylvania will be operated separately and known as National Transit Co., South West Division. All field men employed by South West Pennsylvania in the five counties in southwestern Pennsylvania in which the company has lines have been transferred and hired by National Transit, Contino said.

FATAL SHIPYARD FIRE
$150,000 LOSS, 1 DEAD
A general alarm fire which swept through the boatyard owned by [redacted] at East Norwalk, Conn. on April 10, caused the death of [redacted] and sent four Norwalk firemen to the Norwalk hospital suffering from severe burns received while fighting the fire.
The fire is believed to have started when a boat-owner, working in the bilge of his boat and using a hammer and chisel on an exhaust pipe, struck a spark which ignited fumes in the compartment.

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Among the Drilling Contractors

Number of Active Rigs Declines After Upturn

Rotary rigs operating in the United States and western Canada totaled 2,879 during the week ended March 31, a decline of 29 from the number reported during the preceding seven-day period. The decline interrupted an upward trend in drilling activity that began earlier in the month after the number of active rigs had dropped during the winter months to a low mark of 2,839. Greatest decline during the latest reported week was in the Rocky Mountains and western Canada areas, the former area losing 16 rigs and the latter 17. The overall decline for the United States was only 12 rigs.

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area—	Week ended 3-31-52	Change week ended 3-24-52	Change week ended 4-2-51
Gulf Coast	612	+10	+ 88
N. & W. Tex.-N. M.	1,064	+ 6	+262
Ark.-N. La.-E. Tex.	144	—12	+ 4
Oklahoma	329	+ 3	+ 36
Kansas-S. Nebraska	161	— 4	+ 10
Illinois-Eastern	83	+ 4	+ 8
Rocky Mountains	161	—16	+ 53
Pacific Coast	156	— 3	+ 16
Total U. S.	2,710	—12	+477
Western Canada	169	—17	+ 70
Total	2,879	—29	+547

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the North and West Texas-New Mexico and Oklahoma-Kansas areas are shown on pages 186 and 187.

Noble Drilling Co., Tulsa, has been awarded a contract for a 10,000-ft. wildcat test which The Texas Co. will drill in Breton Sound, Main Pass area, Block 22, Plaquemines Parish, Louisiana.

McCalman & Gunn Drilling Co., Shreveport, has moved in for a Tokio sand test which it will drill for its own account at a wildcat location 2½ miles southwest of Springhill, northern Webster Parish, northern Louisiana. Location is at 1 Boucher estate, in 17-23n-11w.

Brinkerhoff Drilling Co., Casper, Wyo., will use the rig now on Pure Oil Co.'s deep well in the West Poison Spider field, Natrona County, Wyoming, to drill another deep test for the same company in the Schoonover area, 85 miles north in Johnson County. The West Poison Spider well, now being completed, was drilled to a total depth of 16,607 ft. The Schoonover wildcat, 1 Unit, SE NE NW 20-48n-76w, is projected to 11,000 ft. for a Lakota sand test.

National Drilling Co. Moves Rigs to Texas

National Drilling Co., Mount Vernon, Ill., is moving its rigs from the Illinois basin area, where it has been an active contractor and operator, to the West Texas area. Main offices of the company will remain at Mount Vernon to look after the company's producing holdings in the Illinois basin.

Indiana Contractor to Drill in Pennsylvania

Eakle & Holder Drilling Co., Evansville, Ind., will move a rotary rig it has been operating in a gas-storage drilling project near Kankakee, Ill., to the Renova area in Pennsylvania, where it has contracts for a series of gas wells to be drilled for Pipe Line Construction & Drilling Co. of Pikeville, Ky. H. D. Hargrove will be tool pusher on the rig in the Renova operations.

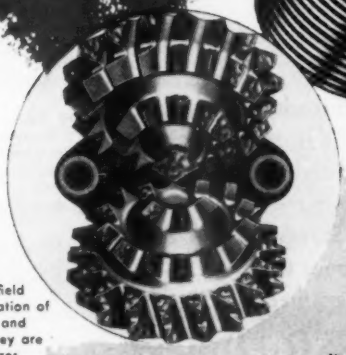
Frontier Drilling Co., Denver, has contracts with L. W. Winkler & Sons and Phillips Petroleum Co. for two additional wells in the Pendroy field, Teton County, Montana. The new operations are 1 Rice, in the NW SW NW 26-27n-5w, and 1 Porter, NE NE SE 27.

Geier-Jackson Drilling Co., Dallas, has a rig working for Vickers Petroleum Co. at a wildcat location more than a mile northwest of production at Eola, Garvin County, Oklahoma. The new operation, 1 Ferguson, is in the SE SW SW 6-1n-2w.

Sam Richardson, El Dorado, Ark., is starting another test on Lion Oil Co.'s Crossett block southeast of Hamburg, Ashley County, southeastern Arkansas. It is Lion's 1-B Crossett, located in the S½ SE SE NW 8-18s-5w. Two previous tests have been abandoned, one 6 miles southwest and the other 5 miles southwest.

Woolf & Magee, Shreveport, will drill another well for A. S. Hodges Industries, Inc., at the north end of the Cotton Valley field, Webster Parish, Louisiana, where the operator has just completed a Pettit lime discovery well. The new operation is 1 Brown-Oden unit, in the C SE SW 24-22n-10w, a half mile north of the discov-

The dollar and cents end of your drill string



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ery well, 1 Treat, which is producing from a depth of 5,866-80 ft. The area is 4 miles north of nearest other production from that pay.

Circle Drilling Co., Lake Charles, La., is starting a projected 9,200-ft. wildcat test a mile northeast of the South China field, in Jefferson Davis Parish, coastal Louisiana. It is drilling for Bates & Cornell. The test is 1 Walker. Location is in 36-7s-4w.

Butler-Johnson Service Corp., Shreveport, is starting another well for Mid-Century Oil & Gas Co. in the newly opened Keatchie Rodessa pay field in northwestern DeSoto Parish, Louisiana. The new operation, 1 Hart, in the NW NW NE SE 6-13n-15w, is a north offset to the discovery well, 1 Williams. Pay zone is at 5,400 ft.

Penrod Drilling Co., Shreveport, has the contract for a projected 13,500-ft. wildcat test which Continental Oil Co. is starting at 1 Jeanerette, in 33-13s-11e, St. Martin Parish, southern Louisiana.

Wolf Brothers are the contractors on the new wildcat operation which Seaboard Oil Co. and Superior Oil Co. are drilling in the South Derby area, Fremont County, Wyoming. The test is carried as 2 Unit. Location is in the NE SE SW 10-31n-98w.

Shrider Drilling Co. is moving in a larger rig at the wildcat test it is drilling for Bill Tomberlin in the Teapot Dome area of Natrona County, Wyoming. The test, 1 Government-Genebach, SW SE SE 2-38n-78w, was drilled to 1,152 ft. with a small rig.

Strawn Drilling Co. is drilling for H. D. Moore at 1 Painter, C SW SW 18-2n-70w, a wildcat located 12 miles southwest of Longmont and about the same distance north of Boulder, in Boulder County, Colorado.

McAlester Fuel Co., Magnolia, Ark., has contracted for a 9,000-ft. Smackover lime test to be drilled for Lawton Oil Corp. at a wildcat location just east of Atlantic townsite in Columbia County, southeastern Arkansas. Location is for 1-A Goode, C SE SW 36-18s-19w.

Kirby Drilling Co. is the contractor on a rank wildcat test which George S. Ankarlo and Bert Jackson of Huntsville, Ark., are starting 2½ miles east of Huntsville, in Madison County, in the northern part of the state. The test is designated as 1 Hargis, with location in the NE NE SW 36-17n-26w.

Cooper-Herring Drilling Co., Tyler, Tex., has a rig working for The Texas Co. at 1 Long and associates, a wildcat test in the D. Parker Survey, 4 miles southwest of Palestine, Anderson County, East Texas.

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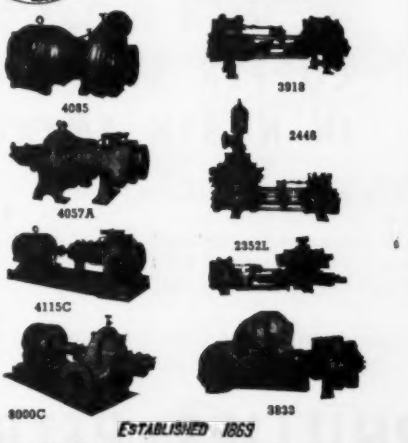

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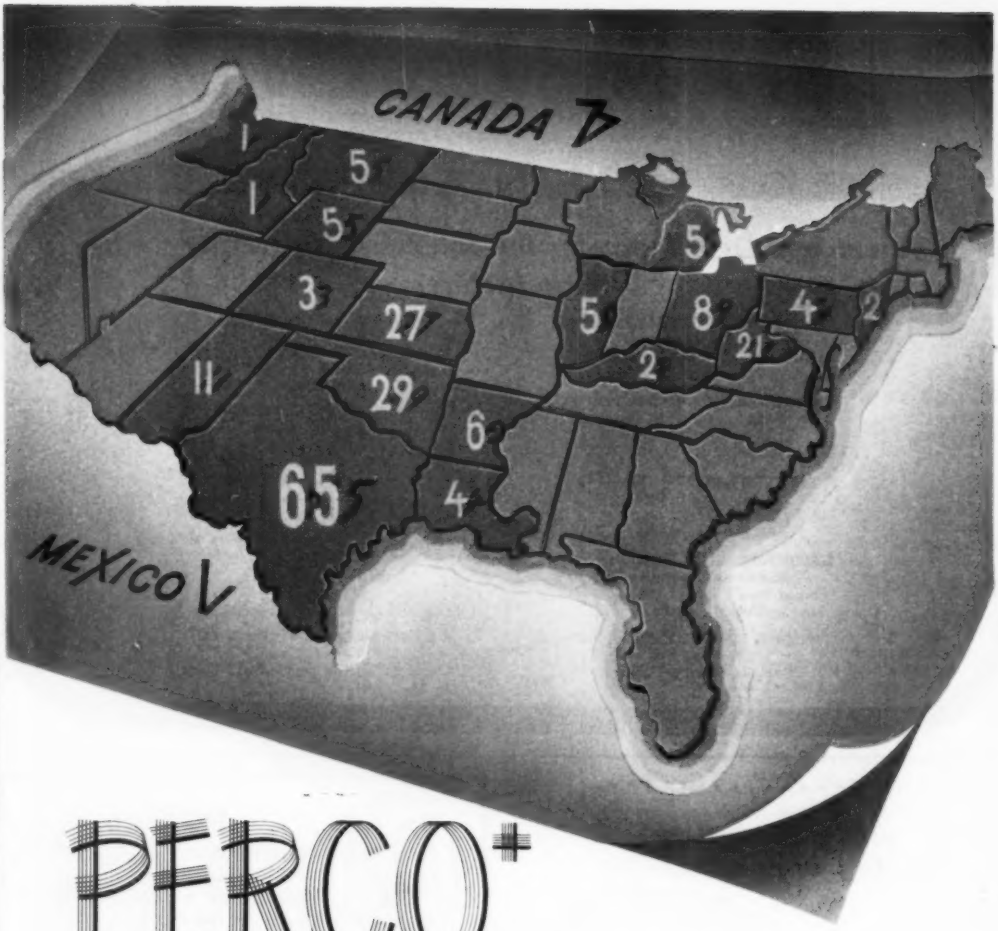

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REFINING

Famariss Buys Warren's Monument, N. M., Refinery

HOBBS, N. M.—Famariss Oil & Refining Co. announced the purchase last week of the Monument, N. M., refinery of Warren Petroleum Corp.

The refinery, located 17 miles southwest of here, has been under lease to Famariss since 1949. Particulars of the sale were not disclosed.

Walter Famariss, Jr., owner of Famariss Oil & Refining, said the company plans to remove the refinery equipment from the Warren site and expand its capacity to 3,000 bbl. per day. Present crude-charge capacity of the plant is listed as 1,200 bbl. per day.

Plans also call for inclusion in the expansion of equipment to improve substantially the octane rating of gasoline.

Completion Set for August On Leonard's Alma Expansion

ALMA, Mich.—Work is progressing here on installation of new facilities which will increase capacity of the Leonard Refineries, Inc., plant from the present 10,000 bbl. to 18,000 bbl. per day.

T. Ellwood Webster, president of Catalytic Construction Co., contractor, said installation of a new synthetic crude tower, additions and revamp of the gas plant, and work on other units should be completed in August.

These facilities will make it possible for Leonard to process 7,000 bbl. per day of gas oils in its catalytic cracking unit which originally had a rated charge capacity of 3,000 bbl. daily.

The unit, designed and built by Catalytic Construction in late 1946, was the first of its type installed at a small plant.

Midland Coop Expanding Cushing, Okla., Refinery

CUSHING. — Midland Cooperative Wholesale Co. has let contracts for a $3,500,000 expansion and modernization program at its refinery here.

New facilities, for which contract has been let to Refinery Engineering Co., Tulsa, include a new 4,360-bbl. U.O.P. fluid catalytic cracking unit, 350-bbl. polymerization plant, and gas-concentration facilities.

The contract also calls for revamping and increasing capacity of the existing thermal unit and visbreaker and boosting capacity of crude units.

The construction program, when completed in the summer of 1953, will boost the refinery's intake capacity from the existing 6,500 bbl. per day to about 10,000 bbl. per day. Engineering work is reported already well advanced.

R. G. Bandy, refinery manager, said tankage at the plant will be increased from the present 500,000 bbl. to 740,000 bbl.

The new cracker will be located on a 15-acre tract recently acquired by Midland. Decision to carry out the Cushing expansion was reached at a board of directors meeting at Minneapolis.

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, October.

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Reciprocating pumps	128.5	138.1	144.6	143.9	183.3
Compressor	114.0	128.0	120.0	118.8	138.1
Engines	109.0	120.0	115.5	117.9	137.1
Motors	110.0	112.7	114.0	130.8	148.8
Transformers	116.0	116.0	116.0	116.0	130.5
Instruments	113.0	120.0	122.0	127.8	142.4
Miscellaneous equipment avg.	114.2	122.1	121.6	126.2	145.2
Materials component	122.4	139.3	143.6	149.5	164.0
Labor component	113.5	128.0	137.1	144.0	156.5
Refinery construction index	117.0	132.5	139.7	146.2	159.5

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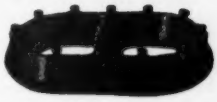

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Ethyl Corp. Makes Available New Diesel-Fuel Additive

NEW YORK.—A new fuel additive which will bring many distillate heating oils within the cetane-number range of commercial diesel fuels has been developed and made available to the oil industry for evaluation by Ethyl Corp.

B. Bynum Turner, vice president in charge of research and engineering for Ethyl, said the compound consists of a mixture of primary amyl nitrates, which is blended into the finished fuel.

The additive is reported to be effective in improving the cetane-number range of all types of diesel fuels, regardless of crude source, refining technique, or sulfur content.

Turner said tests of the product already have been run by the Navy, diesel trucks on the road, and by Ethyl's research laboratories in Detroit.

The tests showed that on the average, five cetane numbers may be gained in a fuel with the addition of 0.13 volume per cent of the ignition improver. A gain of two and one-half cetane numbers is obtainable on the average with .05 volume per cent.

The development is expected by Ethyl to aid greatly in meeting the present heavy demand on middle distillates. Not only has the consumption of diesel fuel quadrupled since before World War II, but demand for the middle-of-the-barrel cuts for heating oils, jet fuels, and as charge stock for catalytic cracking has soared.

Distillates obtained from naphthenic crudes and cracking operations, less desirable for diesel fuel because of inherently lower cetane value than straightrun distillates from paraffinic or mixed-base stocks, can be made acceptable through the new ignition improver, Turner said.

Refining Briefs

The Texas Co. has completed plans for the modernization and expansion of two refineries, at Amarillo and El Paso, Tex., it revealed in its fiftieth anniversary annual report last week. New lubricating-oil facilities are being added at its Lockport, Ill., refinery which will increase productive capacity 3,500 bbl. per day. At the same time, new crude capacity of about 25,000 bbl. daily is being built at the Lockport plant. Work on all projects is expected to be under way by midsummer.

An award of $2,863, the largest ever made under Socony-Vacuum Oil Co.'s suggestion plan, was made recently to Peter G. Kercher, a foreman in the welding department at the company's Casper, Wyo., refinery. Kercher's suggestion resulted in the development of a method for preventing bead-catalyst loss.

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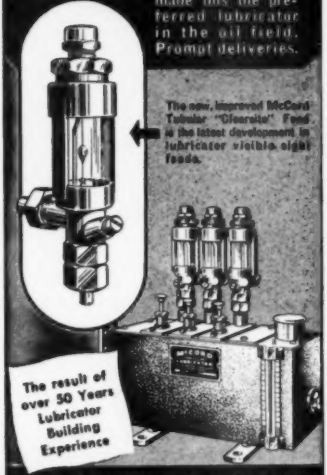

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Description	Volts	Max. Temp.	Ohms/Sq.	Watts Sq. in.	Length of Tape	Width of Tape	Price Complete
E 115-120	115	300°F	0.368	2.5	10'	1¼"	$9.95
E 27-120	27	300°F	0.02	2.5	10'	1¼"	9.85
E 27-28	27	300°F	0.368	2.5	20"	1¼"	4.85

Complete kit includes heat tape, insulation, busses, pads, T-1

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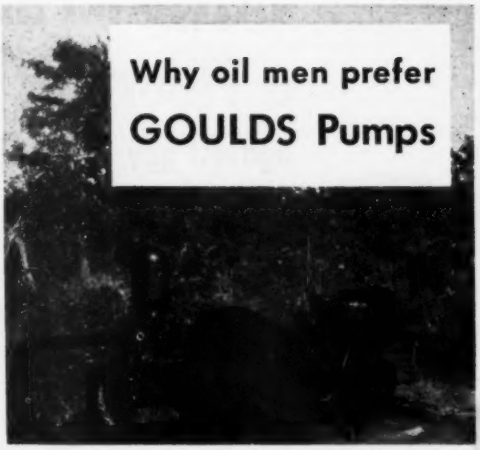

Why oil men prefer GOULDS Pumps

GOULDS Fig. 1813—*"New Pyramid"* Reciprocating Pump. Horizontal, double-acting piston type pump. Motor or belt driven. Capacities 7 to 58 G.P.M.; pressures up to 100 lbs. High pressure units provide capacity ranges of 6 to 20 G.P.M.; pressure up to 250 lbs.

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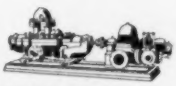
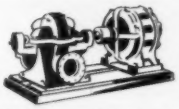
"Goulds cost me less to operate—high pumping efficiencies with low-power consumption."

Get full details from your Goulds representative or write for Bulletin 601.

OTHER PREFERRED GOULDS PUMPS



GOULDS Fig. 3360—High pressure multistage centrifugal. Full range of capacities and pressures. Bulletin 722.5.



GOULDS Fig. 3450—Double-suction, single-stage Goulds centrifugals. Up to 15,000 G.P.M. Heads up to 500 ft. Bulletin 721.2.

GOULDS Fig. 3750—"Support Head" Goulds centrifugals for general and many special liquid handling applications. Up to 4,000 G.P.M. Heads up to 400 ft. Bulletin 715.1.

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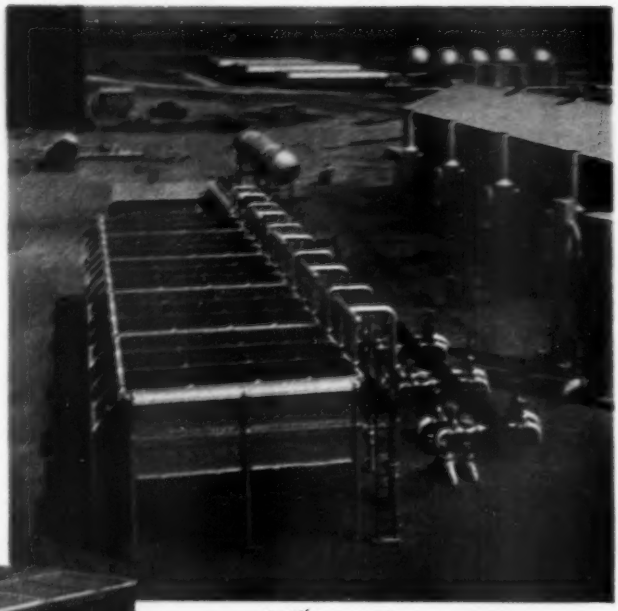

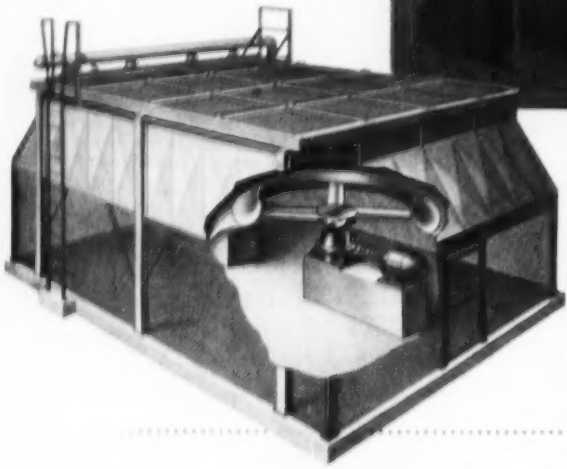

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structural design

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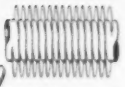

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Gas flaring took a 67 per cent jump during the year. The sharp gain in flaring was attributed to increased oil production in West Texas.

Carbon-black plants consumed 322 billion cubic feet of the total, registering an 8 per cent increase. Gas used for pressure-maintenance and repressuring operations reached 296 billion, while for gas-lift and cycling operations, volumes used totaled 169 billion and 561 billion, respectively.

Gas consumed in the plant-fuel and lease-use category aggregated 356 billion cubic feet, and that lost in extraction climbed 15 per cent to 162 billion cubic feet.

Trans-Northwest Seeks Gas Imports to Serve Washington

WASHINGTON.—Trans-Northwest Gas, Inc., Spokane, is seeking Federal Power Commission authority to import about 100,000,000 cu. ft. of gas daily from northern Alberta and British Columbia to serve markets in eastern Washington, and to export about 10,000,000 cu. ft. daily back into British Columbia.

The company also filed an application for a presidential permit authorizing the imports and exports.

Natural gas would be purchased from Westcoast Transmission Co., Ltd., at a point on the United States-Canadian border near Osoyoos, B. C. Trans-Northwest would then resell some of the gas back to Westcoast at a point on the international boundary in Stevens County, Wash., for service to Trail, B. C.

Trans-Northwest's system in Washington would service Grand Coulee, Spokane, Walla Walla, and Yakima, plus the Atomic Energy Commission's project at Hanford. Details of the company's proposed pipe-line system were not disclosed since it did not apply for a certificate under the Natural Gas Act.

The same project originally was proposed by Westcoast Transmission Co., Inc., but the firm recently revised its plans *(The Oil and Gas Journal, March 31, 1951, page 141)*.

Natural Gasoline

O.N.G. Completes Gathering Lines to Ringwood Plant

RINGWOOD, Okla. — Construction was completed last week on 60 miles of natural-gas-gathering lines to serve the new Ringwood natural-gasoline plant of Warren Petroleum Corp. and Oklahoma Natural Gas Co.

The new plant, scheduled to begin operations April 15, will process about 50,000 M.c.f. of gas per day for the manufacture of 80,000 gal. of products daily.

All available residue gas, estimated at 42,000 M.c.f. per day, will be sold to Oklahoma Natural and will be transported in the O.N.G. lateral from Ringwood to the main-line transmission system southeast of Enid.

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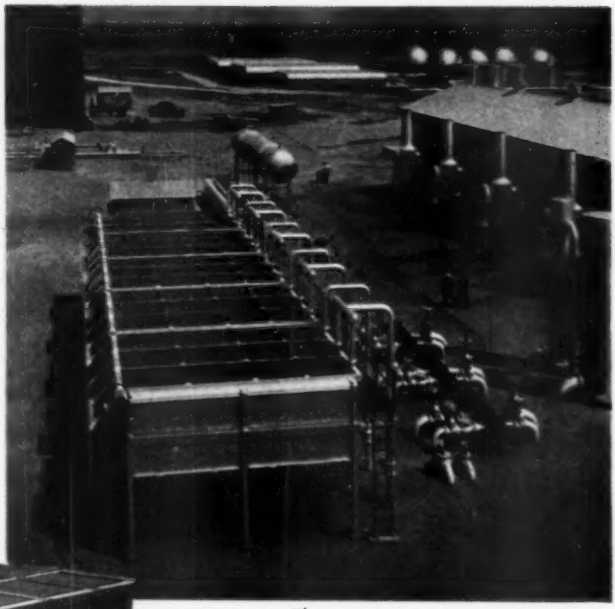

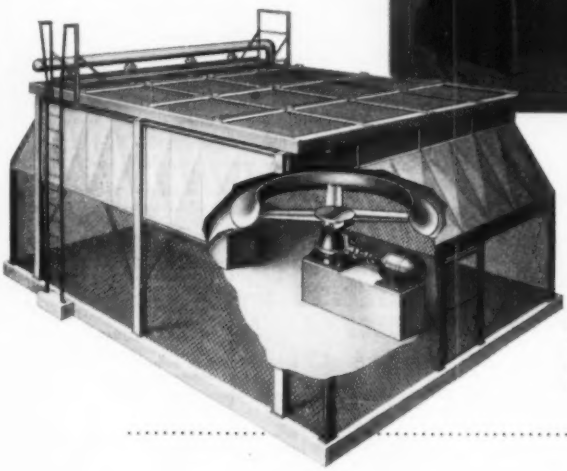

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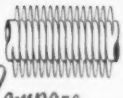

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During the same time, reserves scored a 3 per cent gain from 103 to 106 trillion cubic feet, according to unofficial estimates.

Gas produced in the state for market totaled 3,817 billion cubic feet, up 22 per cent, while transmission lines took 2,750 billion cubic feet, 26 per cent more than in 1950. About 1,732 billion cubic feet of this volume was exported from the state, up 29 per cent from 1950.

Gas flaring took a 67 per cent jump during the year. The sharp gain in flaring was attributed to increased oil production in West Texas.

Carbon-black plants consumed 322 billion cubic feet of the total, registering an 8 per cent increase. Gas used for pressure-maintenance and repressuring operations reached 296 billion, while for gas-lift and cycling operations, volumes used totaled 169 billion and 561 billion, respectively.

Gas consumed in the plant-fuel and lease-use category aggregated 356 billion cubic feet, and that lost in extraction climbed 15 per cent to 162 billion cubic feet.

Trans-Northwest Seeks Gas Imports to Serve Washington

WASHINGTON.—Trans-Northwest Gas, Inc., Spokane, is seeking Federal Power Commission authority to import about 100,000,000 cu. ft. of gas daily from northern Alberta and British Columbia to serve markets in eastern Washington, and to export about 10,000,000 cu. ft. daily back into British Columbia.

The company also filed an application for a presidential permit authorizing the imports and exports.

Natural gas would be purchased from Westcoast Transmission Co., Ltd., at a point on the United States-Canadian border near Osoyoos, B. C. Trans-Northwest would then resell some of the gas back to Westcoast at a point on the international boundary in Stevens County, Wash., for service to Trail, B. C.

Trans-Northwest's system in Washington would service Grand Coulee, Spokane, Walla Walla, and Yakima, plus the Atomic Energy Commission's project at Hanford. Details of the company's proposed pipe-line system were not disclosed since it did not apply for a certificate under the Natural Gas Act.

The same project originally was proposed by Westcoast Transmission Co., Inc., but the firm recently revised its plans *(The Oil and Gas Journal, March 31, 1951, page 141)*.

Natural Gasoline

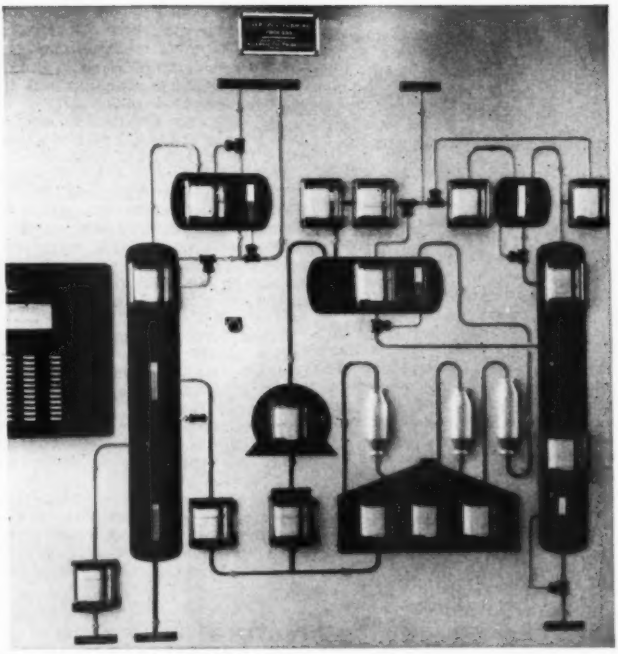
O.N.G. Completes Gathering Lines to Ringwood Plant

RINGWOOD, Okla. — Construction was completed last week on 60 miles of natural-gas-gathering lines to serve the new Ringwood natural-gasoline plant of Warren Petroleum Corp. and Oklahoma Natural Gas Co.

The new plant, scheduled to begin operations April 15, will process about 50,000 M.c.f. of gas per day for the manufacture of 80,000 gal. of products daily.

All available residue gas, estimated at 42,000 M.c.f. per day, will be sold to Oklahoma Natural and will be transported in the O.N.G. lateral from Ringwood to the mainline transmission system southeast of Enid.

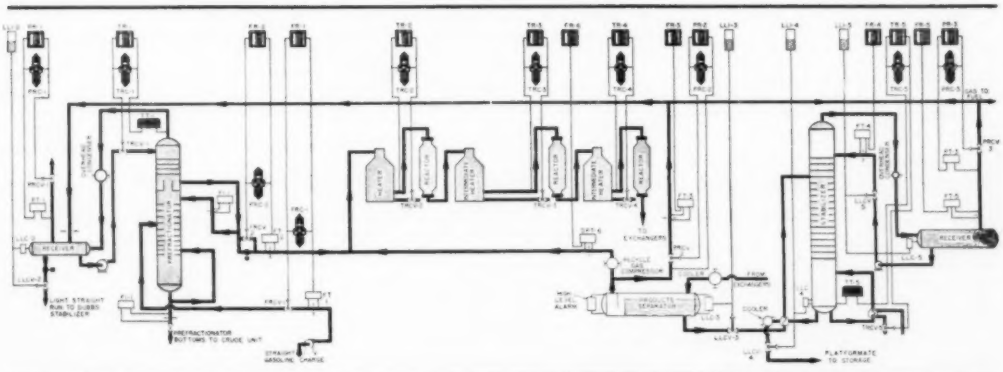
Why did Mid-West PLATFORMING



The Graphic Panel at left, with 16 TRANSET Recorders, also was designed by Universal Oil Products Company, to show all critical variables and control points of the Platforming process at a glance. Operator can check all parts of the process, make any desired changes, right on the board. TRANSET Recorders shown connect to TRI-ACT Controllers on rear of the board, connected in turn to field mounted Taylor Transmitters.

* * *

The drawing below shows the schematic flow diagram and instrumentation of the Platforming process, indicating the wide use of Taylor transmitters, controllers and recorders for maximum efficiency.



Refineries put under TAYLOR TRANSET* CONTROL?

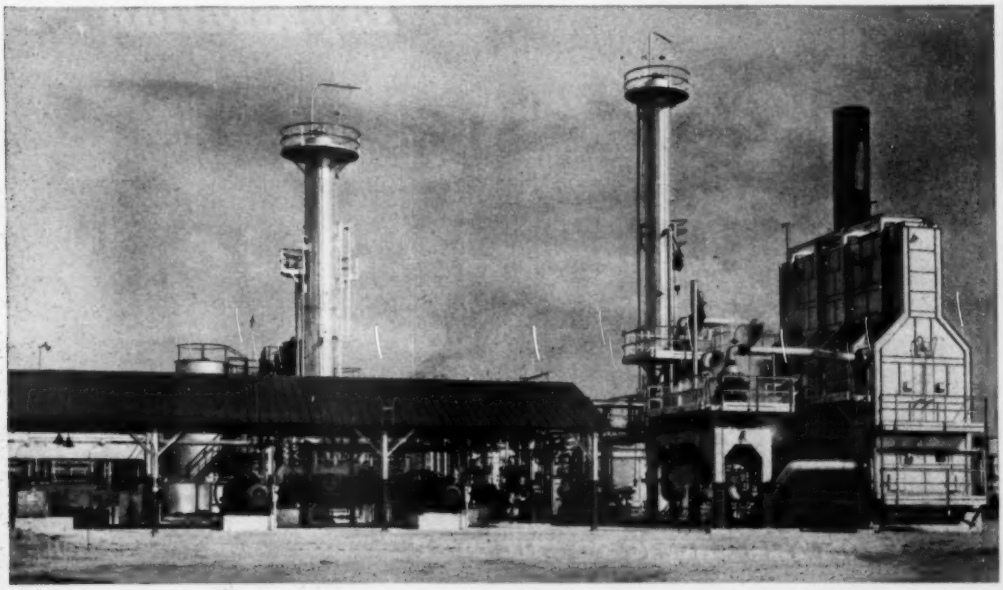
Mid-West Refineries, Inc. at Alma, Michigan, just looked at the performance of Taylor Controls they've used before. Then it was only natural to choose Taylor's exceptionally accurate new three-part TRANSET Control System for their new Platforming process, designed by Universal Oil Products Company and built by Procon, Incorporated. In fact, during their remodeling procedure, they replaced conventional controls on their topping unit with TRANSAIRE* Transmitters, TRI-ACT* Controllers and TRANSET* Recorders—the components of the Transet System.

"With TRANSET Control" says Vice President Everett E. Thompson, "we are having no trouble, for instance, in holding the Platformer transfer temperature at the desired figure. This is important, because of the effect of temperature on octane."

"The Platforming process under TRANSET Control has done an almost unbelievable job; we are able to turn out 90 to 95 octane gasoline, with 90% to 95% liquid yield from straight run," states R. J. Oosdyke, Vice President in Charge of Sales, "and this yield of top quality product puts Mid-West's White Rose gasoline in an extremely favorable competitive position."

This is just a single example of how Taylor's new TRANSET Control system is helping refiners get top quality product at minimum operating cost. Why not talk it over with your Taylor Field Engineer! Or write for **Bulletin 98097.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*

*Reg. Trade-Mark



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Fractured Porosity

AS was to be expected, the greatest general interest expressed at the Los Angeles meeting of geologists was in the symposium on fractured reservoirs arranged by Edward A. Koester, chairman of the American Association of Petroleum Geologists' research committee.

Oil and gas-producing reservoirs in fractured rocks are nothing new. Florence field in the southwestern corner of the Denver-Cheyenne (Julesburg) basin, generally considered to be the second oldest oil field in the United States produces from fractured zones in the lower part of the Upper Cretaceous-Pierre shale section. However, the potentialities of this type of porosity had escaped serious consideration in recent years until the Spraberry sand of West Texas' Midland basin began to draw nation-wide attention about 1 year ago.

Thus, despite the long-known possibilities of fractured porosity the fact that its importance had until recently been neglected can be looked upon as meaning that geologists now have another type of trap to look for—a trap new in the same way that stratigraphic traps were new when East Texas field came in; a trap new in the same way reefs were new at the time of the discoveries of Alberta's Leduc, Redwater, and Golden Spike, and West Texas' Scurry County reefs. A. I. Levorsen, in his introductory remarks for the evening panel discussion following the afternoon presentation of papers on developed oil and gas-producing fractured reservoirs, expressed this kind of newness by saying, "the present interest in fractured porosity is a revival of an early interest sparked — or one might say 'Pearl Harbored'—by the discovery of the great oil accumulation along the updip wedged-out porosity belt which is now the Spraberry trend of West Texas."

Only time can tell just how significant the phenomenon of fractured porosity may eventually prove to be, but there is little question that fractured reservoirs should provide many oil fields. It will be strange indeed if it is not some day shown that a great many producible fractured reservoirs have been drilled through. How not to overlook fractured porosity in a

drilling well in the immediate future is the big problem today.

Knowledge of the origin of fractured porosity could do a great deal toward aiding the search for fractured reservoirs. Right now about all that's generally known is that fractures sufficiently developed to reservoir oil are found in brittle rocks of many kinds, and that these fractures are formed by structural movement or by shrinkage. Those reservoirs formed by shrinkage will require a completely new exploratory approach because they may in no way be dependent on structures or pinchouts of known porous rocks to which the present methods of prospecting are keyed.

Where can these fractured reservoirs be expected? Porosity due to fracturing can be expected anywhere that there is a section of sedimentary rocks, and reservoirs will be found either in that sedimentary section or in buried, "topographically high" basement rocks. There are, however, several areas in the United States characterized by large volumes of heretofore-considered-uninviting, fine-grained rocks that should be reconsidered. In his introductory remarks, Levorsen suggested six areas ("a tentative, partial list") which deserve immediate reevaluation with greater weight given to the potentialities of the fine-grained rocks. Those areas are (see map): Cretaceous rocks of the Great Valley of California; both Mesozoic and Paleozoic rocks of the Great basin of western Utah and eastern Nevada; Paleozoic rocks of the Anadarko basin of Oklahoma, in the Ouachita Mountains of Arkansas and Oklahoma, and in the Appalachian region of Pennsylvania, Virginia, and West Virginia; and in the Mesozoic rocks of the Florida Peninsula.

Those six regions should be enough to start on. There can be little doubt but that the papers and discussion of the fractured-reservoir symposium, which are to be published by the A.A.P.G. (either as a supplement to the association's bulletin or as a special volume), will be studied with intense interest when they become available this fall. *Philip C. Ingalls.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

CALIFORNIA.—The Texas Co. has set casing at 6,260 ft. at 10-1 Honor Rancho, SE SE 36-5n-17w, and a substantial producer in the Sterling sand appears assured. Successful completion of this well would link Honor Rancho and Castaic Hills fields.

WYOMING.—Continental Oil Co. found an Embar section with staining and recovered oil on test of the Embar-Tensleep at another new-pay completion in Sussex field. This is the first Embar development with saturation in this portion of the Powder River basin.

OKLAHOMA.—Continental Oil Co. 1 Kimball, 34-20n-16w, southwestern Major County, flowed gas at the rate of 8,230 M.c.f. daily on casing test. No estimate of fluid productivity has been made. This discovery is more than 25 miles from Ringwood field, nearest production.

PERMIAN BASIN.—Buffalo Oil Co. 12-B Baish has been completed as the deepest producing well in the basin. Potential was 578 bbl. daily through ¾-in. choke from open hole at 13,554-73 ft.

Texas Gulf Coast

New Pool Opened in Hardin County Area

HOUSTON.—J. P. Owen has opened a new oil pool in Hardin County approximately 12 miles north of Silsbee. The well, 2 Doty and Jackson, W. N. Cox Survey, Abstract 13, flowed 96 bbl. of 36.5°-gravity oil daily from casing perforations at 6,408-09 ft. From tubing perforations at 6,268-70 ft., the well flowed 135 bbl. of 38.4°-gravity oil per day.

In the Magnet-Withers area of Wharton County, J. M. Flaitz of Houston has completed 1 Lehman unit, wildcat 1¼ miles northwest of Magnet field, for 69 bbl. of 27.2°-gravity oil daily through 12/64-in. choke. The well is producing through perforations at 5,677-79 ft. under tubing pressure of 650 psi.

In the Mineral area of Bee County, Wilcox production seems apparent at Morris Cannan and Richardson Brothers 1 A. J. Kimball, which had oil shows in the Massive and the Luling. Operators have set casing to 7,587 ft. and are preparing to test the Massive at 7,522-28 ft. The Luling will be tested later around 7,200 ft. Oil shows in the Massive were recovered in cores at 7,530, 7,528, and 7526 ft. and a gas show at 7,440 ft. The Slick sand had previously been drill-stem tested at 7,069-85 ft. but only salt water was recovered. This prospective discovery is located 1½ miles southeast of the new Cannan field, which was discovered earlier this year at Cannan 1 Willis Robertson. This well produces from the Slick sand. The Kimball well is located in Henry Coley Survey, Abstract 138.

Shell Oil Co. has tested a small amount of distillate and gas at 1 Kirby Lumber Corp. Tract 110-A, wildcat 2½ miles southwest of West Village Mills field, Hardin County. A previous test at 7,074-81 ft., with tool open 6 hours showed the well good for 96 bbl. of oil daily. These perforations were squeezed, and a second test was made at 6,780-87 ft. which recovered the gas and distillate. It is reported that crew is preparing to squeeze these perforations for further testing.

Wrather Petroleum Co. 1 Mrs. M. Lutenbacher estate, wildcat 1 mile south of Goliad in Goliad County, has been brought under control after gas in the well blew core barrel through drill pipe into top of the derrick. Operator had cored interval 5,567-72 ft. before blowout occurred. Two feet of gas sand with oil odor was found in bottom of core barrel. Bit is stuck at 5,562 ft., which is 10 ft. off bottom, and operator will mill out the bit prior to drilling on to 5,700 ft.

Potential test has been run at Michael T. Halbouty 2-A J. B. Gary estate "A" and "B," new pay zone discovery on the south flank of Boling field, Wharton County. From perforations at 6,712-26 ft., the well gaged 156 bbl. of 26.5°-gravity oil daily through 9/64-in. choke. Tubing pressure registered 820 psi. and casing pressure 900 psi. Well is located in S. F. Austin and Seth Ingram League 9, 2 miles south of Boling townsite.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Chambers County: Oil discovery—East Turtle Bay-Corley & Geiselman 2 Modesto White et al., James T. White Sur., A-300, TD 8,887 ft., perf. 6,553-57 ft., IP: 30 bbl. oil per day, ⅛-in. choke, 37.4° gravity, CP 1,550 psi.

Colorado County: gas discovery—Sinclair Oil & Gas Co. 1-A H. R. Houck, Tract A, I&GN Sur., Sec. 53, A-269, TD 11,705 ft., Miocene 2,573-93 ft., IP: 50,000,000 cu. ft. of gas per day, SIP 1,038 psi.

Fort Bend County: new pay at Fulshear—Ginther, Warren & Ginther 1 Mrs. Ethel Tucker Christian, I&GN Sur. 2, A-268, TD 7,850 ft., perf. 7,512-15 ft., IP: 116 bbl. oil per day, ⅛-in. choke, 36.6° gravity, TP 950 psi.

Galveston County: new pay at Hanna Reef—Sun Oil Co. 1 State Tract 233, St. Tract 233, Galveston Bay, TD 10,806 ft., perf. 4,913-15 ft., IP: gas well, no gage.

Jefferson County: new pay at Nome—Sun Oil Co. 1 Hugh Long, John Blair Sur., TD 8,000 ft., perf. 7,473-77 ft., IP: 157 bbl. oil per day, ⅛-in. choke, TP 1,450 psi., 45.6° gravity.

Lavaca County: oil discovery—Commercial Petroleum & Transport Co. et al. 2 Arthur E. Evans, John J. Mays Sur., TD 5,572 ft., perf. 5,490-94 ft., IP: 8 bbl. oil per day, 48° gravity.

Newton County: new pay in Call area—Houston Oil Co. of Texas et al. 1 J. H. Kurth, Jr., Trustee et al., TD 8,300 ft., perf. 7,462-66 ft., IP: 21,000,000 cu. ft. of gas per day, plus some 61.8°-gravity distillate, open flow, SIP 2,553 psi.

Victoria County: gas discovery—Monterey Oil Co. 1 J. R. Johnson, J. M. Cobarrubias Sur., A-9, TD 4,833 ft., perf. 2,015-25 ft., IP: 5,000,000 cu. ft. of gas per day, ⅛-in. choke, TP 800 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

DeWitt County: Henshaw Bros. 2 Mrs. Annie Vaughn, Simon Cockrell Sur., 21 mi. N of Victoria, dry, TD 8,265 ft.

Goliad County: Schimmel-Taylor Co., 1 J. A. Dunman et al., Sampson McTenal Sur., dry, TD 2,223 ft.

Jefferson County: Meredith, Clegg & Hunt et al. 1 W. C. Gilbert, R. P. McAllister Sur., A-688, dry, TD 12,612 ft.

Lavaca County: Texas Eastern Production Corp. 1 Frank J. Orsak, James Kerr Sur., A-24, dry, TD 10,000 ft.

Montgomery County: Hagen-Litchfield 1 Joe Bybee, John Carr Sur., A-157, dry, TD 5,632 ft.

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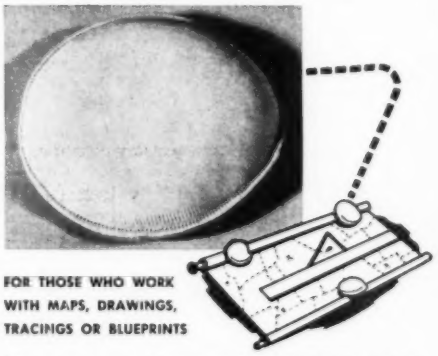

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Permian Basin

Upton County Wildcat Is on Swabbing Tests

MIDLAND.—Sinclair Oil & Gas Co. 1-TXL-Upton, wildcat southwest of Pegasus field, was still trying to make a well from the Pennsylvanian after drilling to 11,195 ft. in the Devonian.

Operators had perforated casing between 10,490-520 ft., washed with mud-acid and loaded the hole with 240 bbl. of oil. Swabbing recovered 191 bbl. of the load in 12 hours, with fluid level standing around 5,000 ft. Fluid level rose 500 ft. while standing 45 minutes following the above swabbing.

In west-central Upton County, Anderson Prichard Oil Corp. and Greenbriar Oil Co. 1 Windham gaged 30 bbl. of oil an hour after treating the Wolfcamp limestone at 9,094-9,116 ft. After swabbing load and residue the well kicked off and gaged 30, 22 and 22 bbl. in 3 hourly periods.

In Culberson County, M. A. Grisham's gas discovery had set 7-in. casing on bottom at 9,054 ft. Plans were to core ahead after drilling cement plugs. Magnolia Petroleum Co. 1-A Cowden was drilling lime and shale at 6,520 ft.

Sinclair 7 June Tippett, north extension to Pegasus field, kicked off and flowed 267 bbl. of oil in 6 hours, following acid treatment through perforations in the Pennsylvanian at 10,395-455 ft.

Sinclair 10 June Sanders, semi-wildcat in the northern section of the Sweetie Peck field, prepared to test after washing open hole from 13,090-218 ft.

In the central-north section of Wilshire-Ellenburger field, Sinclair 8 McElroy completed for 813 bbl. of 53°-gravity oil a day, flowing through open 2½-in. tubing from total depth at 12,449 ft.

A second test has been scheduled for Adcock field of Dawson County by Amerada Petroleum Corp. as the 1 Clint M. Wright, north offset to the discovery well. Projected depth was 11,000 ft.

Phillips Petroleum Co. 1-EE University, Ellenburger wildcat on the west side of the Block 12 field, Andrews County, unloaded oil from drill pipe following a drill-stem test in the Ellenburger from 10,655-80 ft. Estimated recovery was 1,962 ft. of clean oil.

Second test from 10,680-715 ft. unloaded 2,100 ft. of oil-cut water blanket and 5,951 ft. of clean oil.

Top of the Ellenburger was reported at 10,665 ft., on elevation of 3,317 ft., which was said to be low to Atlantic Refining Co. 1-A University, Ellenburger failure about 2 miles to the northeast.

In north Andrews County, Aurora Gasoline Co. 1 C. R. Cothes, 21-A23-PSL, was installing pump after making about 100 bbl. of oil a day on swabbing tests. Perforations were from 5,975-85 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crockett County: M. H. McKinney 1 W. P. Hoover, 16-NW-University, TD 3,000 ft., gas pay 2,060-84 ft., IP 500,000 cu. ft. gas, shut-in pressure 400 si.

Martin County: Ryan Consolidated Petroleum Corp. 1 Willie Peters, 11-36-T1S-T&P, TD 7,189 ft., elev. 2,712 ft., Spraberry 7,072 ft., pay 7,077 ft., TP pumped 8 bbl. 36°-gravity oil.

Runnels County: Geochemical Surveys 1 G. M. Wood, Blk. 8, A. Losoya Sur. 515, TD 4,057 ft., elev. 1,846 ft., pay 3,838 ft., IP 221 bbl. 44°-gravity oil in 9 hours, 20/64-in. choke, TP 750 psi., GOR 1,550 cu. ft.

Humble Oil & Refining Co. 1 G. W. Poe, CTRR Sur. 71, TD 4,448 ft., elev. 1,956 ft., perforated Goens limestone 4,442-48 ft., IP 408 bbl. 45°-gravity oil, ¼-in. choke, TP 400 psi., GOR 291 cu. ft.

Miami Operating Co., Inc. 1 C. L. James,

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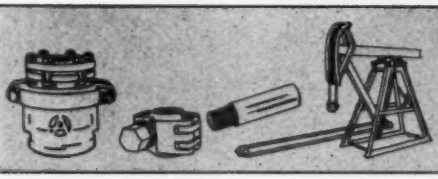

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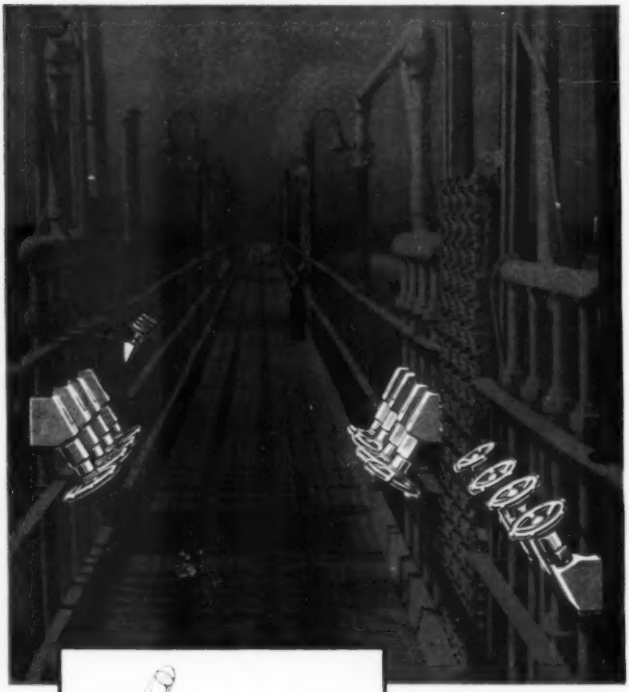

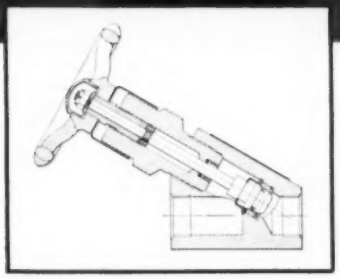

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533-18-N. Travis Sur., TD 2,507 ft., perforated 2,464-68 ft., IP 211 bbl. 43°-gravity oil, 12/64-in. choke, TP 185 psi., GOR 600 cu. ft.

Restal Drilling Co. 2 R. T. and R. L. Williams, L. D. Counts Sur. 2, TD 4,277 ft., elev. 2,230 ft., perforated 4,233-40 ft., IP 74 bbl. 43°-gravity oil, 12/64-in. choke, TP 225 psi., GOR 1,260 cu. ft.

Susan Petroleum Co. 1 Mitchell, Sec. 44½, F. Boyle Sur., TD 4,355 ft., elev. 1,974 ft., perforated Fry sand 4,346-49 ft., IP 124 bbl. 43°-gravity oil, 14/64-in. choke, TP 850 si., GOR 6,596 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: J. S. Abercrombie 1 Lockhart & Brown, 15-A42-PSL, dry, TD 10,020 ft., elev. 3,244 ft., Mississippian 9,260 ft., Devonian 9,890 ft., Woodford 9,696 ft.

Glasscock County: Plymouth Oil Co. 3 S. C. Currie, 28-32-T4S-T&P, dry, TD 2,940 ft.

Kent County: Stanolind Oil & Gas Co. 1-A J. J. Emery, 63-1-H&GN, dry, TD 7,705 ft., elev. 2,125 ft., reef 6,820 ft., Mississippian 7,280 ft., Ellenburger 7,585 ft.

Runnels County: Murray Petroleum Co. 1 E. J. Kemp, Sec. 176, M. Cotton Sur., dry, TD 4,409 ft., elev. 1,662 ft., dry 3,677 ft., Caddo 3,620 ft.

Murray Petroleum 1 H. F. Linderman, 532-33-D. Diaz Sur., dry, TD 3,840 ft., elev. 1,824 ft., Gardner 3,900 ft., Caddo 4,083 ft.

Schleicher County: Edwin L. Cox 1 T. R. Henderson, 17-L-GH&SA, dry, TD 6,716 ft., elev. 2,336 ft., Palo Pinto 4,535 ft., Strawn 5,460 ft.

Stanolind Oil & Gas Co. 1 T. C. Meador, Sec. 1,216, TCRR, dry, TD 7,445 ft., elev. 2,542 ft., Ellenburger 7,410 ft.

Sterling County: Scott L. Talliaferro 1 Ruth Allen, 8-15-H&TC, dry, TD 2,006 ft.

Tom Green County: Marion J. Scott and Russell Hays 1 Bob H. Sharpe, E. A. Tweedy Sur. 2, dry, TD 604 ft.

SOUTHEASTERN NEW MEXICO

Buffalo Oil Co. 12-B Baish, Devonian discovery in the shallow Maljamar field of Lea County, has been completed and put on production. Completion gage was 578 bbl. of 47°-gravity oil a day through ¾-in. choke, from open-hole pay at 13,554-73 ft., total depth. Top of the Devonian was 13,548 ft., on elevation of 4,022 ft. The well is the seventh deepest producer in the United States and the deepest for the Permian basin.

The Texas Co. 1 J. H. Moore, Devonian discovery in 25-11s-32e, prepared to run casing after making a number of successful drill-stem tests. Last reported test was from 10,451-75 ft. which had oil at the top in 52 minutes and flowed 44 and 48 bbl. of oil into tanks the first and second hours.

West of East Caprock field, The Texas Co. 1-BEXX State found sulfur water on a test of the Devonian from 11,825-950 ft.

Skelly Oil Co. completed 2-L Mexico in 5-25s-38e as a 1-mile south extension to Fusselman production, and second well for that formation, in the East Dollarhide area of southeast Lea County. Completion potential was 1,074 bbl. of 42°-gravity oil a day through 12/64-in. choke. Pay section was perforated from 8,630-60 ft.

Gulf Oil Corp. 11-D Harry Leonard in 33-25s-38e will drill to 8,400 ft. as a Devonian test, said to be the first for the area.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Sweet Oil Well Equipment, Inc., 1 Alice Sidall, 7-20s-38e, TD 3,958 ft., elev. 3,566 ft., pay 3,810 ft., IP flowed 10 bbl. 36°-gravity oil, TP 10 psi.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: Vega Corp. 1 Pipkin-Federal, 31-26s-30e, dry, TD 3,274 ft., elev. 2,925 ft., Delaware lime 3,170 ft.

Eastern Texas

New Gas Pay Seen for New Douglass Field

DALLAS.—Field reports indicated Humble Oil & Refining Co. had found a new gas pay in its 2 S. B. Hayter, confirmation test in the new Douglass field of Nacogdoches County. Final perforations from 9,048-62 ft. had not been tested at this writing.

Humble's discovery, the 1 Ruth Franks, completed in the Rodessa from perforations at 8,044-60 ft., and the 1 Hayter, H. Ham Survey, was drilled dry.

In Bowie County, American Liberty Oil Co. 4 T. A. Jackson, wildcat 2½ miles southeast of Dalby Springs, completed for a pumping potential of 256 bbl. of oil a day. Top of Paluxy and pay section was 4,363 ft. on elevation of 284 ft.

Operators were building roads for American Liberty 1 Heard, projected 5,000-ft. test 3 miles southeast of Dalby Springs in the T&PRR Survey.

Humble 1 Rufus Howard, Freestone County wildcat northwest of Teague, was waiting on completion potential tests after perforating three separate pay zones. Total depth was 7,988 ft., plugged back to 6,770 ft. Perforations from 6,805-70 ft. in the Rodessa made an estimated 4,000,000 cu. ft. of gas. Pettit perforations at 7,213-7,385 ft. made an estimated 5,000,000 cu. ft. of gas a day, and Travis Peak perforations from 7,600-7,700 ft. flowed an estimated 1,400,000 cu. ft. of gas. Distillate yield, if any, had not been reported.

In Grayson County, Kerr-McGee Indus-

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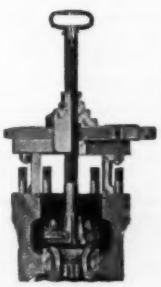

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tries 1 Hollingshead, southwest of Macomb, was drilling in the Ellenburger at 5,075 ft.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Wood County: Humble Oil & Refining Co. 1 Yantis Gas unit 9, H. H. Arnold Sur., 3½ mi. NE Yantis, TD 8,192 ft., perforated 8,060-70 ft., IP 28.2 bbl. 50°-gravity oil, ½-in. choke, TP 23 psi., GOR 4,396 cu. ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Fannin County: J. J. Lynn 1 Sarah Bron Est., S. Howell Sur., dry, TD 5,100 ft.

Grayson County: Harper-Turner Drilling Co. 1 Moser, R. Carson Sur., dry, TD 3,593 ft.

Navarro County: J. L. Collins & Co. 1 Irene Stockton, Powers Sur., dry, TD 3,399 ft.

South Louisiana

Plaquemines Discovery Flows Condensate

NEW ORLEANS.—John W. Mecom and Freeport Sulphur Co. 1 Ernest Cockrell, Jr. et al. wildcat discovery in Lake Washington area, Plaquemines Parish, flowed 190 bbl. of 53.9°-condensate daily through 13/64-in. choke. Well is producing from perforations at 11,872-11,934 ft. under tubing pressure of 3,000 psi. Hole is bottomed at 12,029 ft. with 7-in. casing set at 12,017 ft. New discovery is located in 35-19s-26e.

Potential test has been run at Pan American Production Co. 1 Miami Corp. "B," 14-15s-4w, discovery well at Little Pecan Lake field, Cameron Parish. Through ¼-in. choke, the well flowed 264 bbl. of 34.9°-gravity oil daily from perforations at 12,508-64 ft. Tubing pressure registered 3,888 psi.

A possible new discovery in Acadia Parish is Pan American 1 Archille Andrepent (formerly abandoned by J. M. Flaitz), wildcat in Iota field area, 42-8s-1w. A possible oil sand was logged at 10,676-10,700 ft., and a good blow was had on drill-stem test of this interval. Operators used ¼-in. chokes on this test, and surface pressure was from 2 psi. to 0 psi. in 25 minutes

On the northwest flank of Block 33, off the east edge of Plaquemines Parish, The Texas Co. is preparing to test 1 State Lease 1,959. Electric log indicated an oil sand in the well, and operator will perforate from 7,849-58 ft. for testing.

Terrebonne Parish has prospects of a new discovery at Leslie Bowling 1 La Terre Co., 38-19s-19e, wildcat in the Baptiste area, approximately 4 miles south and east of Lirette Houma gas field. Gas-distillate sands were logged from intervals 10,553-76 ft. and 10,466-80 ft. Also a possible 13 ft. of net oil sand was logged from 11,600-26 ft. The well had an orginial projected depth of 12,000 ft., however, operator is now drilling below 12,031 ft.

At Magnolia Petroleum Co. 1 Ragley Lumber Co. "D," 29-5s-7w, deep wildcat in Allen Parish, liner perforations became plugged up and no test has been made of the zone from 18,586-18,660 ft. Operators are attempting to test around 12,800 ft. It is believed that the deep perforations are clogged beyond remedy.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: condensate discovery—The Texas Co. 3 Bradish-Johnson, 20-18s-26e, TD 13,074 ft., perf. 10,937-49 ft., IP: 18 bbl. of condensate plus 3,820,000 cu. ft. of gas per day, TP 4,090 psi., 39.1° gravity.

SOUTH LOUISIANA WILDCAT FAILURES

Plaquemines Parish: Richardson & Bass 1-H Humble-Vaughn Portie et al., 9-15s-14e, dry, TD 12,933 ft.

St. Bernard Parish: John L. Loeb 1 St. Lse. 1824, dry, TD 9,361 ft.

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Louisiana-Arkansas

Union County Discovery Completed in Smackover

SHREVEPORT.—Union County, Arkansas reports a new completed oil discovery at Martin Wunderlich 1 Reynolds-Gammill Lumber Co., C SW NW 36-16s-5w, 1½ miles northeast of Lisbon. The wildcat was completed as a marginal Smackover lime well for 6 bbl. of oil daily from perforations 6,426-29 ft. Hole is bottomed at 6,588 ft. Discovery has been tentatively called West Lisbon.

Lawton Oil Corp. is moving in rig for a proposed 9,000-ft. Smackover test at A-1 Russell Goode, C SE SW 36-18s-19w, southeastern Columbia County. Drill site was selected on basis of seismic work completed in the area.

Lion Oil Co. is moving in rig and will spud at B-1 Crossett Lumber Co., C 8-18s-5w, wildcat 10 miles southeast of Hamburg, Ashley County. New test lies about 5 miles northeast of A-2 Crossett, NE SW 27-18s-6w, abandoned at 3,513 ft. in Cotton Valley with no shows.

George S. Ankario and Bert Jackson have spudded and are drilling at 100 ft. at a new 2-3,000-ft. venture in Madison County, north Arkansas, at 1 Hargis, C NE NE SW 36-17n-26w.

Louisiana.—Crews fought high pressure at Southwest Gas Producing Co., Inc., and W. C. Feazel 1 Redwine, 1,675 ft. from north line, 685 ft. from west line NE 11-17n-3w, important southern Lincoln Parish venture. Hole is bottomed at 10,086 ft., believed to be in upper Cotton Valley. The wildcat is located 5½ miles east of Simsboro field.

A large number of sacks of drilling mud have been put into the well. Several times the well appeared that it might get out of control.

Production has been indicated prior in Travis Peak on test from 9,698-9,726 ft. Recovery was water cushion heavily cut with gas and condensate. When the wildcat is completely under control, a core will be taken to determine the formation from which the pressure is being exerted.

A. J. Hodges Industries, Inc., E. V. Whitwell, H. W. Perritt, F. B. Treat, and U. Albritton are moving out rig before completing 1 F. B. Treat et al. The Pettit discovery on north end of Cotton Valley field, Webster Parish, cleaned to pits at 125 bbl. of 44°-gravity oil daily. Production is from 5,866-80 ft., opposite a 7½-ft. sand section 5,867-74½ ft. Total depth is 5,975 ft., production casing cemented at 5,967 ft. Nearest Pettit production is 4 miles south in the center of Cotton Valley field.

The King-Heyne 1 N. Smith, C NW NE 24-20n-15w, Rockpoint field, Caddo Parish, has indications of being the best Rodessa oil well in the new field. Eight feet of good permeable lime with saturation from 3,794-3,804 ft. in the lower anhydrite stringer zone plus additional pay in Rodessa was logged. Well had a 16-ft. and and 8-ft. lime section with oil shows between 3,804-3,900 ft.

In Webster Parish, McCalman & Gunn Drilling Co. are coring below 2,700 ft. for Buckrange at 1 Boucher estate, 17-23n-11w, 2½ miles southwest of Springhill. Hole is to be drilled to 3,150 ft. to test Tokio sand.

LOUISIANA SUCCESSFUL WILDCAT

Union Parish: Southwest Gas Producing Co. 1 Foster, 720 ft. S and 885 ft. E NWc SW 8-19n-2e, flowed 4,600 M.c.f. of gas from Travis Peak 4,909-22 ft., TD 5,250 ft. (discovery tentatively called Point).

LOUISIANA WILDCAT FAILURE

De Soto Parish: Lawton Oil Co. 1 Mansfield Hardware-Lumber Co. "A," C SW SE NW 3-10n-11w, dry, TD 5,971 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: Martin Wunderlich 1 Reynolds-Gammill Lumber Co., 160 ft. W C

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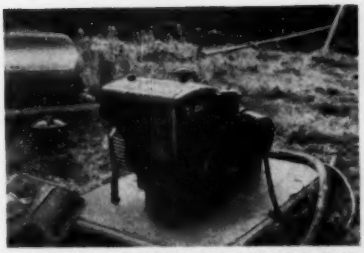

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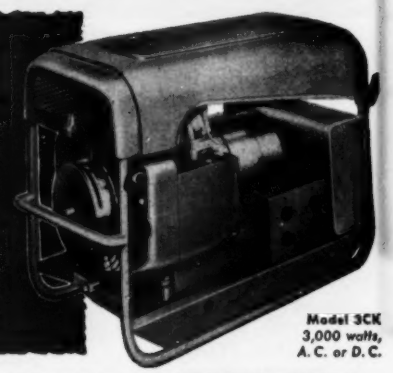

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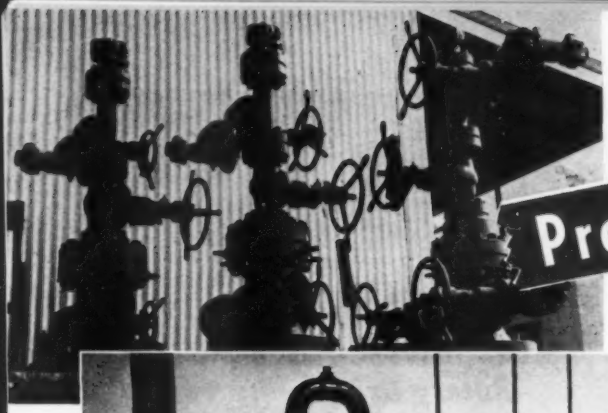

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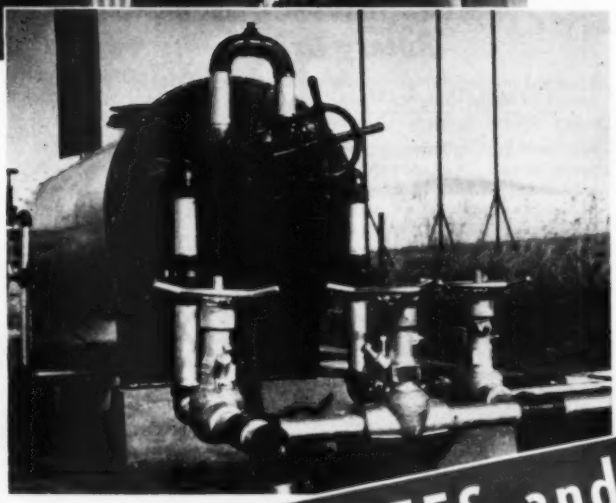

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SW NW 36-16s-17w, pumped 5 bbl. oil from Smackover 6,426-29 ft., TD 6,588 ft. (discovery tentatively called West Lisbon).

ARKANSAS WILDCAT FAILURES

Ashley County: Lion Oil Co. 2 Crossett Lumber Co. "A," 200 ft. E C NE SW 27-18s-6w, dry, TD 3,515 ft.

Cleveland County: Garland Anthony Oil Co. 1 V. C. Moore, C SW SW NW 27-9s-10w, dry, TD 1,829 ft.

Appalachian-Ohio

West Virginia Wildcat Is Completed as Gas Well

PITTSBURGH.—In Roaring Creek district, Randolph County, West Virginia, Nollem Oil & Gas Corp., Agt., completed what has now turned out to be a very important wildcat test located on the Hiram anticline. It is 1 Goff-Arnold Land Co., Sago Quadrangle, elevation 2,751 ft., 600,000 cu. ft. gas, fifth sand. The well blew open for 4 days and when capped it had a rock pressure of 560 psi. in 11 hours. Location for No. 2 has been made approximately 2,200 ft. southwest. Considerable leasing activity is now under way in this area by major companies and independents. Pipe line facilities will have to be extended for the marketing of the gas. Union district, Putnam County, Godfrey L. Cabot, Inc., 5-1369 Hatfield Campbell Creek Coal Co., resulted in 1,980,000 cu. ft. gas, Corniferous lime 4,909 ft., Oriskany sand 5,002 ft., gas 5,007-5,015 ft., TD 5,024 ft.

Pennsylvania.—Napier Township, Bedford County: South Penn at al—Snee & Eberly 1 Jesse B. Miller, is being plugged and abandoned. The Trenton was recorded at 7,810 ft., the Beeckmantown lime at 8,837 ft. with sour gas at 8,870 ft. and 8,890 ft., TD 8,987 ft. Unity Township, Westmoreland County, Peoples Natural Gas Co. 4003 A. J. Dotterway, elevation 2,094 ft., is drilling at 7,477 ft.

Maryland.—Garrett County: Maryland Gas Co. 1 Stanley Smith, elevation 2,502 ft., recorded the chert 4,102 ft., Oriskany sand 4,231 ft. and is drilling at 4,292 ft. Eberly & Snee 3 Eli Beechie topped the Oriskany sand at 4,190 ft., drilling 4,282 ft. Cumberland & Allegheny Gas Co. 1 Jasper Riley, elevation 2,405 ft., reached the chert at 2,863 ft., with gas at 2,886-2,909 ft., testing 18,000 cu. ft., drilling at 2,912 ft. Oil Ventures, Inc. 1 George Beckman, elevation 2,835 ft., is drilling at 5,940 ft., the Oriskany sand at 5,929 Heath 1 H. C. Gibson shut down at 3,625 ft. to acidize.

PENNSYLVANIA WILDCAT FAIRURE

Bedford County, Napier Township: South Penn at al—Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., dry, Trenton 7,810 ft., Beeckmantown lime, 8,837 ft., sour gas 8,870 ft. and 8,890 ft., TD 8,987 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Randolph County, Roaring Creek district, Nollem Oil & Gas Corp., Agt. 1 Goff-Arnold Land Co., 600,000 cu. ft. gas, 560 psi. rock pressure, fifth sand, TD 2,310 ft.

OHIO

Wray Drilling Co. moved one location east of an old producer on Ross Johnson lease in Lot 19, Hopewell Township, Licking County, and completed a fair well at 3 Johnson. The Clinton sand, at 3,095-3,145 ft., made a good showing natural and 42 bbl. of oil in 24 hours after shot.

Several new wildcats are getting underway: Frank Lyons 1 Standard Slag Co., Lot 73, Shalersville Township, Portage County, is drilling; Ed Obermiller et al is drilling on Lee Gamauf, Lot 33, Copley Township, Summit County, their second test in the township; J. L. Swingle et al are drilling a test in the east side of Newton Township, Muskingum County, on 1 Walter Farrington, Sec. 22.

Mississippi

Wilcox Strike is Completed in Adams County

JACKSON.—What is considered to be one of the better Wilcox wells in Mississippi has been completed at J. P. Evans et al 1 A. K. Ellis, 12-5n-2w, located between Kingston and Wayside fields, Adams County. From perforations at 6,507-11 ft., the well flowed 132 bbl. of 37.8°-gravity oil daily through ⅛-in. choke. Tubing pressure on the test was 560 psi. and casing pressure 455 psi. Approximately 20 ft. of saturation was present in this well between 6,506-26 ft. An oil sand was also present at 6,456-62 ft. and 6,490-92 ft., but these sands have not been tested. There is a possibility that future drilling will link this discovery with Kingston field.

At its third confirmation attempt to Pollard field, Escambia County, Alabama, Humble Oil & Refining Co. has set 5½-in. production casing to total depth of 5,982 ft. The well, 1 Lister et al. unit, SE NW 18-1n-9e, direct south offset to the field discovery, is reported to have encountered a drilling break at 5,977 ft. (—5,774 ft.), and core was cut at 5,979-82 ft. Recovery was 3 ft. of sand with good show of oil. If this proves to be top of lower Tuscaloosa, this test is 48 ft. lower structurally than the discovery well, and is 23 ft.

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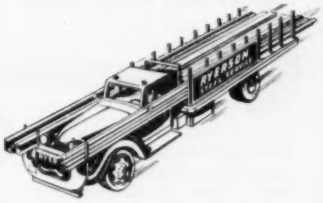

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below the most optimistic water level. The Lister well is flat with Stanolind Oil & Gas Co. 1 Steward, dry hole located approximately 1½ miles northwest, which cored 6 ft. of sand with good shows, but could not be successfully completed.

Lion Oil Co. 2 Denkmann, interesting deep test in Rankin County, Mississippi, is now coring below 16,200 ft. While at total depth of 16,200 ft., operator went in hole with a rock bit to bottom of 7-in. casing at 15,088 ft. and circulated and cut drilling mud weight from a fraction above 14 lb. to 12 lb. per gallon. When the mud weight was lowered, the well began to kick and casing pressure reached 2,500 psi. The gas was caught and was reported to be noninflammable. Well was then killed with 14.5 lb. per gallon mud, rock bit was run to bottom and hole conditioned before diamond coring was resumed. It will be recalled that a sand section immediately below the casing was drill-stem tested and recovery was noninflammable gas.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: oil discovery "North Kingston"—J. P. Evans et al. 1 A. K. Ellis, 12-5n-2w, TD 7,109 ft., Wilcox 6,507-11 ft., IP: 132 bbl. oil per day, ⅛-in. choke, TP 560 psi., 37.8° gravity.

MISSISSIPPI WILDCAT FAILURES

Adams County: B. Serio 2 Parker Est., 20-7n-1w, dry, TD 6,310 ft.

Holmes County: George A. Miller 1-B Ellis Presley, 11-12n-3e, dry, TD 4,665 ft.

Wilkinson County: Gulf Refining Co. 10 Crosby Lumber Co. et al., 42-4n-1e, dry, TD 7,035 ft.

ALABAMA WILDCAT FAILURE

Wilcox County: Gulf Refining Co. 1 C. C. Sellers, 13-11n-7e, dry, TD 7,514 ft.

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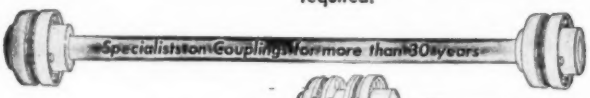

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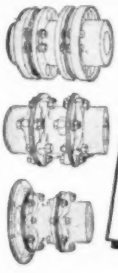

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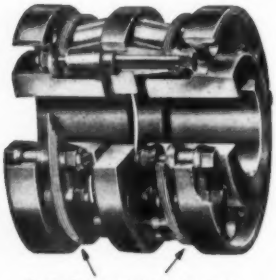

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North Central Texas

Operator Drills Ahead At Montague County Test

WICHITA FALLS.—First drill-stem test at Transcontinental Oil Co. 1 M. M. Gilbert, Montague County test 6½ miles southeast of Nocona, developed 135 ft. of heavily oil-cut mud from 4,958-72 ft. Operators were drilling ahead on a 6,750-ft. contract.

George S. Engle has announced plans to drill a 7,000-ft. wildcat 4 miles southwest of Belcherville in Montague County. It will be the 1 W. L. Eubanks, in Section 159, N. Kimbro Survey. Location is on a 226-acre tract.

Jack Grace Drilling Co. 1 Mrs. J. C. Bryant, 1 mile east of Montague, had gas in 13 minutes and recovered 2,340 ft. of clean oil on a 2½-hour drill-stem test at 5,821-38 ft. Drilling continued below 5,984 ft.

Southwest of Wichita Falls, Akin & Dimock 1-A Cunningham, Vogtsberger sand discovery, was waiting on completion potential after flowing 10 bbl. of oil an hour through 16/64-in. choke. Pay section was perforated from 4,883-4,906 ft.

Wichita County gained a deep wildcat at Royal Development Co. 1 Lochridge, 5 miles north of Holliday in the L. Netherly Survey, A-240. Contract depth was 4,700 ft.

In Cooke County, Continental Oil Co. 1 H. M. Berry, 5 miles north of Rosston, was drilling ahead below 5,785 ft. after a 1-hour test in granite wash at 5,725-48 ft. developed 15 ft. of mud, with no shows.

J. R. and Adam Seitz 1 Montgomery estate, prospective sand discovery 2 miles southwest of Bulcher, prepared to perforate at 2,295-2,303 ft. Drill-stem test from 2,294-2,307 ft. had gas in 6 minutes; the well flowed an unestimated amount of oil for 1 hour, and recovery was 2,300 ft. of oil in drill pipe.

Mid-Continent Petroleum Corp. has announced location for a 5,400-ft. wildcat 4 miles northwest of Haskell. Location for the test, the 1 J. J. Thomas, is in 29-1-H&TC.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Kenneth Ellison 1 B. D. Ikard, Lot 2, Blk. 5, Clark & Plumb, TD 4,808 ft., elev. 1,081 ft., Vogtsberger 4,102 ft., IP pumped 45 bbl. 41°-gravity oil.

Megargel Drilling Co. 1 J. B. Frerich, 106-4-Clark & Plumb, TD 982 ft., pay 979 ft., IP pumped 48 bbl. oil.

Clay County: Armour Properties 2-C Scaling, Blk. 103, J. H. Belcher Subd., TD 4,574 ft., Lucy Armour Strawn pay 4,505 ft., IP 253 bbl. 42°-gravity oil, 20/64-in. choke, TP 90 psi., GOR 350 cu. ft.

Coleman County: L. J. Maxwell and M. W. Freeman 1 Faynette Cooley, Curtis McShan Sur., TD 986 ft., pay 972 ft., IP pumped 46.8 bbl. 43°-gravity oil.

Texo Oil Co. 1 T. K. Martin, 62-4-HT&B, TD 1,798 ft., pay 1,751 ft., IP pumped 9 bbl. 43°-gravity oil.

Eastland County: Shirley & Venuto 1 C. V. Fox, 28-2-McLennan CSL, TD 1,198 ft., pay 1,197 ft., IP pumped 36 bbl. 36°-gravity oil.

Haskell County: Mid-Continent Petroleum Corp. 1 L. F. Taylor, 31-1-H&TC, TD 5,376 ft., Sojourner pay 5,230-90 ft., IP 242 bbl. 41°-gravity oil, TP 235 psi., GOR 714 cu. ft.

Jack County: Warren Oil Corp. 1 W. E. Ruth, 1-A574-SPRR, TD 2,412 ft., pay 2,402 ft., IP pumped 78 bbl. 42°-gravity oil, GOR 189 cu. ft.

Montague County: J. B. Revier 1 Mrs. L. A. McNabb, 11-A516-MEP&P, TD 5,925 ft., dual completion, Caddo perforations 5,808-23 ft., IP 360 bbl. 40°-gravity oil, 20/64-in. choke, CP 438 psi., GOR 600 cu. ft.; top Bend pay 5,918 ft., IP 504 bbl. 40°-gravity oil, 20/64-in. choke, TP 600 psi., GOR 710 cu. ft.

Palo Pinto County: J. C. Ross 1 W. C.

Bridges, J. F. Smith Sur., A-410, TD 1,747 ft., sand pay 1,744 ft., IP 86 bbl. 38°-gravity oil, open tubing, GOR 500 cu. ft.

Taylor County: Saxon Exploration Co. 1 GC&SF, Sec. 445, Abner-Woolsey Sur. 444, TD 4,327 ft., pay 3,940 ft., IP 215 bbl. 42°-gravity oil, 12/64-in. choke, TP 180 psi., GOR 480 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Bredshall Oil Co. 2 Atchley, 5-A46-BBB&C, dry, TD 1,197 ft., Gunsite 1,141 ft.
Bridwell Oil Co. 2 Belle Wisdom, Jose Ostane Sur., A-333, dry, TD 1,691 ft.
C. G. Butts 1 L. M. Hayter, TE&L Sur., A-2,436, dry, TD 1,425 ft.
Tom B. Medders 15-A Margaret Hancock, 7-1-H&TC, dry, TD 5,487 ft.
J. B. Revier 1 Anna Mangold, Blk. 4, P. Harris Sur., dry, TD 4,702 ft.

Baylor County: Rubsam & Kouri 1 Louis Kubala, T&NO Sur. 149, dry, TD 2,700 ft.

Callahan County: J. R. Tolbert 1 Celia McCrea, 305-5-SPRR, dry, TD 3,662 ft.
Texas Pacific Coal & Oil Co. 1 Alice Caldwell, Sec. 355, G. Hancock Sur., dry, TD 1,936 ft.

Coleman County: British American Oil Producing Co. 1 D. D. Rice, Sec. 56, HT&B, dry, TD 2,000 ft., elev. 1,730 ft., Adams Branch 1,193 ft.
Clark & Cowden 1 J. P. McCord, Sec. 18, McCord & Lindsey Sur., dry, TD 4,026 ft., upper Capps 3,508 ft., lower Capps 3,608 ft., Gray 4,010 ft.
Dalco Development Co. 1 U. S. Brannon, S. Sprague Sur. 659, dry, TD 2,670 ft., elev. 1,560 ft., Caddo 1,980 ft.
Sid Katz 1 O. L. Hambright, J. Greenwood Sur., dry, TD 3,521 ft., Fry 3,265 ft., Jennings 3,377 ft.
Louisiana Machinery Co. 1 Josie Hughes, 34-2-GH&H, dry, TD 3,560 ft.
Miami Operating Co. 1 Hayden Hargett, James Priestly Sur. 675, dry, TD 3,056 ft.

Cooke County: Van Grisso Oil Co. 1 Joe Sicking, R. Alexander Sur., dry, TD 3,320 ft., Ellenburger 3,290 ft.

Erath County: Dale Smith 1 J. L. Kiker, F. James Sur., dry, TD 4,135 ft.

Haskell County: T. D. Humphrey 1 J. D. Wheatley, C. Irwin Sur. 67, dry, TD 4,437 ft., elev. 1,527 ft., reef 3,000 ft.

Jack County: Franklin Love & Co. 1 Johnson, J. C. Lindsey Sur., dry, TD 4,762 ft.
J. W. Starr 1 A. B. Perkins, 27-2-Henderson CSL, dry, TD 5,129 ft.
Warren Oil Corp. 1 Fayette Yates, B. C. Mayer Sur., dry, TD 6,006 ft., Caddo 4,702 ft.

Jones County: T. B. and A. C. Dillard 1 A. L. Mullins, F. M. Smith Sur. 3, dry, TD 1,880 ft.
J. A. Harris 1 MK&T RR, Sec. 14, BBB&C Sur., dry, TD 3,605 ft.

Palo Pinto County: Con Melland 1 Penn Heath, 60-2-T&P, dry, TD 1,408 ft.

Shackelford County: Sojourner Drilling Co. 1 S. P. Robertson, 1-8-T&P, dry, TD 3,895 ft.

Stephens County: E. R. Perkins 1 E. P. Akin, Sec. 87, BAL Sur., dry, TD 4,220 ft.
Star Oil Co. 1-A Eugene Tipton, Nancy Williams Sur., dry, TD 4,593 ft.
Warren Oil Corp. 1 Geo. Glasscock, Sec. 56, Albert Sidney Johnson Sur., dry, TD 4,567 ft., Caddo 3,590 ft., Mississippian 4,464 ft.

Wichita County: Fortex Oil Co. 1 D. F. Bailey, H. Hastie Sur., dry, TD 1,350 ft.
R. Clay Underwood 2 Ruben Parish, Blk. 18, Cowherd Bros. Subd., dry, TD 180 ft.

Young County: Morton, Dolley & Elder 1 Mary McBrayer, Sec. 1,907, TE&L Sur., dry, TD 4,371 ft.

Canadian Fields

Light Crude Strike Is First For Saskatchewan

CALGARY.—Light crude oil with gravity of 33° was discovered in the Driver area of central west Saskatchewan by Albercan Oil Corp., subsidiary of Canada Southern Oils, Ltd. The Driver discovery, Saskatchewan's first indicated commercial light crude oil strike, was made in the Viking sand formation at a location 27 miles east of the Alberta border and 90 miles southwest of North Battleford.

The discovery well, Canada Southern-Albercan 4 Driver, on the SW¼ of Section 29-31-24w3, encountered top of the Viking at around 2,256 ft. and ran initial drill-stem test in that formation from 2,255 to 2,267 ft. for 1 hour. Natural gas flowed to the surface almost immediately, and reached a maximum rate of 270,000 cu. ft. daily. Oil flowed to the surface in 23 minutes, and the 33°-gravity crude was allowed to flow for 37 minutes. Valve leaked when packer was being pulled, and recovery consisted of 180 ft. of oil and 1,900 ft. of mud and fresh water from the drilling fluid. There was no formation water.

Twenty-two ft. of water-free Viking sand section has so far been opened at the discovery well. All of that zone, however, is not oil productive, but it is expected that from 15-20 ft. of the open section would yield oil in commercial volume.

Latest cored interval, from 2,274-78 ft. gave up mostly shale with some sand stringers that had oil saturation but cores did not show any indication of salt water on test. Hole was reamed to 9 in., and when drill-stem test of the 2,256-78 ft. indicated productive section was attempted, the packer failed to hold and a test was not possible.

After fully penetrating and testing the Viking, company officials stated that the Driver discovery well will be carried down to test the Banff sand formation that is producing heavy crude oil at Coleville, 4 miles to the east, and then go down to its Devonian objectives. The 4 Driver well is 1 mile northeast of Driver railpoint and 17 miles northwest of Kindersley town.

The Driver strike is the second crude oil discovery for Saskatchewan so far in 1952. The first Saskatchewan discovery was made in early January, at a venture in the Fosterton area, around 93 miles southeast of Driver. The Fosterton discovery found its oil in the Lower Cretaceous and rated 24°-medium gravity crude at 296 bbl. daily during initial potential test.

Canadian Gulf Oil Co. is continuing drilling operations in the D3 zone of Devonian at its natural gas-condensate-oil discovery well in the Nevis area of central Alberta. The discovery well, Gulf 4 Lampert, on LSD 4 32-38-22w4, is 14 miles west of Stettler Devonian oil wells and 90 miles northeast of Calgary.

The Lampert well contacted D2 Devonian zone at 5,540 ft. or 2,804 ft. subsea (K.B. elevation 2,736 ft), and entered D2 porosity at 5,549 ft. Drill-stem tests in that zone down to 5,587 ft. gave up substantial natural gas at rates up to 8,000,000 cu. ft. daily and also yielded some naphtha recovery.

A dense shale band was encountered from 5,587-92 ft., and then crew again cored into a porous section that appeared to be D3 but may have been a continuation of D2. Tests in that section yielded natural gas at maximum rate up to 12,000,000 cu. ft. daily, plus naphtha recovery.

Another dense shale band showed from 5,628-55 ft., and porosity was again entered. Natural gas, 36°-gravity oil and water was recovered during drill-stem test in this latter porous section. Last test, run to 5,702 ft. gave up only water. Hole was cored from 5,702-5,894 ft. and cores showed porosity plus salt water. Drilling operations were resumed and crew is currently making hole below 6,203 ft., still in D3 Devonian zone.

An exact D3 top has not as yet been specified, and it is unlikely that it will be until an electric log has been run at the discovery well. It is the company's intention to fully penetrate the D3 prior to plugging back for further production tests.

The Winchell Coulee wildcat in the Alberta foothills belt that 3 weeks ago discovered natural gas and distillate in the Cardium sandstone, is believed to have fully penetrated the Cardium formation and is currently heading down in search for its lower objectives. The well is being drilled by Canadian Delhi Oil, Ltd., on farmout lands from Britalta Petroleums, Ltd., at a location around 35 miles northwest of Calgary.

The 'wet gas' discovery well, Delhi-Britalta 1 Winchell Coulee, is on LSD 10-24-29-6w5. Only production at the well came from the top 10-ft. interval in the Cardium during drill-stem test from 5,236-46 ft. Other tests in the Cardium failed to yield gas or distillate and was also free of water. Some 400 ft. of Cardium sand is present at the discovery well. The discovery drill-stem test gave up a flow of natural gas in 2½ minutes, at maximum rate of 3,000,000 cu. ft. daily through 1½-in. choke, and was continuing to build up at end of the 45 minute test. Throughout the test there was a spray of distillate to the surface and pipe recovery was 130 ft. of distillate that rated a gravity in excess of 60°.

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Pound sand which is expected within another 500-600 ft. if it is present. Current depth of the well is 5,668 ft. Hole will be carried down to test all formations to and including the Madison limestone.

CANADIAN SUCCESSFUL WILDCAT

Gulf-Crown 8 Edward, LSD 8-26-60-16w4, TD 6,251 ft., capped gas well.

CANADIAN WILDCAT FAILURES

Trans Empire-Pacific 1 Hy Charger, LSD 11 20-42-22w4, TD 5,728 ft.

Tor-Royalite 3 Bonnyville, LSD 9 21-61-4w4, TD 1,235 ft.

Calvan-Cedar 1 Tartan, LSD 16 20-1-5w4, TD 3,743 ft.

Trans Empire-Lodestar 1 Joseph Lake, LSD 4 31-50-21w4, TD 5,256 ft.

Central-Del Rio-Royalties 3 Lac La Biche LSD 7 34-69-13w4, TD 895 ft.

Phillips 1 Lubican, LSD 10 28-86-12w5, TD 4,673 ft.

Climax 1 Pete, LSD 12 5-3-15w4, TD 3,202 ft.

Gas Exploration 1 Pinhorn, LSD 7 24-1-9w4, TD 3,274 ft.

Amerada Crown 34-5 HF, LSD 2 5-73-23w5, TD 10,278 ft.

EASTERN CANADA

In southwestern Ontario, Western Ashley Minerals, Ltd., and Anchor Petroleums, Ltd., have let contract to the Rawlings Drilling Co. of Chatham to drill two tests for gas and six for oil in the first stage of a large scale gas and petroleum exploration program in Ontario by companies associated with Stuveysant North, Ltd. The two gas wells will be drilled on a 650-acre lease offsetting producing wells of the Union Gas Co. and Western Ashley has plans to build lines to deliver the gas to common carriers. Production is expected around 1,500 ft. depth. The six tests for oil will be located on 30,000 acres underlain with gas and oil-bearing formations and in the same general area as producing wells drilled by Imperial Oil and other companies.

Systematic development and exploratory work is being continued in 1952 by Union Gas Co. which has completed surveys on 514,000 acres in Kent, Lambton and Middlesex counties. In 1951 the company drilled 16 wells, all but one based on gravity surveys, and brought in four producers with aggregate open flow of 9,370,000 cu. ft. These included a well, completed last June in Moore township, Lambton County, with initial open flow of 7,500,000 cu. ft., making it one of the best completions in recent years. The 1952 program, with geological work supervised by Dr. C. S. Evans, will be primarily designed for exploration for new gas reserves, further gravity surveys and a continued drilling program being indicated.

In Brant County, Ontario, Petrol Oil & Gas Co. will drill six shallow gas wells in the Brantford area. Drilling is on a reservation of 43,696 acres first developed by the company 31 years ago. At present the company has 37 producing wells, and is planning to ultimately increase the total to 100.

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California

Honor Rancho Linked to Castaic Hills in Sterling

LOS ANGELES.—Linking of the Honor Rancho field with Castaic Hills field, eastern Santa Clara Valley, Los Angeles County, appeared to be assured at the first of the week. It was anticipated the wildcat, The Texas Co. 10-1 Honor Rancho, would make a large producer in the Sterling sand.

The link well, in SE SE 36-5n-17w, is located about midway in the ¾-mile stretch which separates the two fields. Drilled to 6,540 ft., 7-in. casing was set at 6,260 ft. Earlier tests in the shallower Wayside and Rancho sands, which produce in Honor Rancho, indicated their productive possibilities were not too good.

The fact Sterling sand production has been established within two locations of the Honor Rancho field indicates this sand also will be productive in that field. Aside from a dry hole on the south flank of the field, none of its eight wells were carried deep enough to test possibilities of the deeper zone. The dry hole, 4 Honor Rancho, showed the presence of a deeper pay (Honor sand) which is believed to be the Sterling pay in Castaic Hills, but like the two upper Honor Rancho pays it was wet.

In the Castaic Hills portion of the 2-mile trend, four wells were nearing the upper Miocene pay and their outcome should be known within a week. These were wells of Continental Oil Co., Richfield Oil Corp., Douglas Oil Co. and Dolley, Morton & Dolley. Continental recompleted 32-36 Harding using the Hydrafrac process. Originally completed in mid-March for 140 bbl. daily, the well was rated at 200 bbl. daily after being treated.

Productive limits of Guadalupe field, San Luis Obispo County, may have been extended ½ mile by Thornbury Drilling Co. 1-3 LeRoy. Located in 1-10n-36w, the outpost was drilled to 2,818 ft. and 8¾-in. casing was set at 2,744 ft. A 7-in. liner was being run at last reports.

In the Cuyama Valley area of San Luis Obispo, Richfield Oil Corp. was preparing to redrill an abandoned wildcat. In Carrizo Plains a suspended well was taken over by Gene Reid Drilling, Inc. and will be deepened. The Richfield well, 1 Schlauderman in 23-11n-28w, had been abandoned in late 1948 at 3,234 ft. after reportedly encountering about 50 ft. of good sand at 2,815 ft. The Carrizo wildcat, 9 miles northeast of Russell Ranch and in 5-11n-26w, last year had been drilled to 2,506 ft. by Navy Oil Co. The new operator plans to deepen the test, 2 Navy, to 5,000 ft.

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about 4 miles from South Cuyama production. Superior Oil Co. was grading roads for 1 Cuyama-Government. Location of the wildcat is in NE 21-9n-26w. About ½ mile west of Morales Canyon field on the northwest end, North Basin Exploration Co. was moving in equipment for 1 Whitney in NE 9-11n-28w.

In San Joaquin Valley, Standard Oil So. of California set casing on a "no dope" core hole ¾ mile south of Kern Bluff production. The wildcat, 1 Fee Core Hole in NE SW 19-29s-29e, was believed to have encountered an oil show at about 1,800 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Fresno County, ⅝-mile northwest extension to Camden field: B. B. Breckenridge 1 Georgeson, SW NW 31-16s-20e, pumped 100 bbl. per day through perforations at 5,940-48 ft. and 5,988-6,008 ft., 32°-gravity crude. TD 6,288 ft., elev. 306 ft.

Fresno County, new Stevens "B" zone pool in Buena Vista Hills: Standard Oil Co. 503 "9D," SW NW 9-32s-24e, flowed 168 bbl. per day from fractured shale at 3,533-4,398 ft., 30.5°-gravity crude, 48/64-in. bean. TD 4,400 ft., elev. 1,012 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Bellevue area: Superior Oil Co. 23-2 Quinn et al., 2-30s-26e, dry, TD 7,812 ft., elev. 371 ft.

Kern River area: A. C. Skillington 1 Cohn, 17-28s-28e, dry, TD 791 ft., elev. 1,086 ft.

Salt Creek area: Ferguson & Bosworth 4 Anderson, 19-29s-21e, dry, TD 469 ft.

Los Angeles County, Castaic area: Continental Oil Co. 1 Vier-Kenny, 22-5n-17w, dry, TD 4,612 ft., elev. 2,150 ft.

Ridge basin area: British-American 41-13 General, 13-5n-17w, dry, TD 5,818 ft., elev. 1,760 ft.

Tulare County, Visalia area: Eureka Refining Co. 1 Eureka-Wright-Hart-Comm. 14, 14-19s-25e, dry, TD 1,953 ft., elev. 346 ft.

Oklahoma

Gas Flow Tested in Major County Wildcat

CONTINENTAL OIL CO.'s indicated Chester lime, gas-distillate discovery well, 1 Kimball, NW NW SW 34-20n-16w, north of Seiling, in southwestern Major County, western Oklahoma, flowed at the rate of 8,230,000 cu. ft. of gas daily on casing test, and 6,150,000 cu. ft. per day on tubing test. Flow rate dropped to 4,416,000 cu. ft. per day after 30 minutes. The brief test was not through separators and no estimate could be made of fluid productivity. Operators now are setting tanks to complete the well, located more than 25 miles from nearest other production, the Ringwood field, on the eastern side of the county.

Pay zone of the well is open through casing perforations at 8,372-8,404 ft. and 8,412-52 ft. Bottom of the casing (5½-in.) is at 8,572 ft. in hole drilled to 11,861 ft. Plug-back depth is 8,536 ft. At its total depth, the well was in Arbuckle dolomite, topped at 11,695 ft. Top of the Chester lime was logged at 8,368 ft. A drill-stem test of the zone recovered 1,710 ft. of 56.5°-gravity distillate in 74 minutes.

Phillips Petroleum Co. and associates are continuing to test their 1 Flynn, C SE SE 27-11n-23w, deep, prospective discovery well located 6 miles north of Sayre, northwestern Beckham County, in the extreme western part of the state. Operators perforated casing at 15,000-73 ft. The well got a small "kick" at the start of tests, and since has been swabbed down to 4,000 ft., but, as this is written, has failed to flow. If production is established, the well will be the third deepest producer in the county. Prospective pay zone is from granite wash in the Pennsylvanian Deese section.

Another western Oklahoma rank wildcat, Sunray Oil Corp. 1 Wolfe, C NW NE 4-25n-25w, southwestern Harper County, has encountered promising indications of gas-distillate production in Morrow sand (lower Pennsylvanian) but is coring ahead to the Mississippian. The Morrow zone was topped at 7,190 ft. A 70-minute drill-stem test at 7,191-7,231 ft. got a gas flow estimated at 1,664,000 cu. ft. per day. Recovery was 450 ft. of gas-cut mud. Bottom hole pressure was 2,450 psi. Location is 3 miles south of Laverne and about 8 miles southwest of the Southwest Stockholm field, nearest production.

Gulf Oil Corp. is getting another producer, its third and indicated best to date, in its deep Northeast Bradley field, Grady County. The prospective new producer is 2 Mainka-Ring unit, C SE SW 1-5n-5w, northwest diagonal offset to the discovery well (state's deepest producer). Drilled to a total depth of 13,178 ft., it is a potential producer in at least four horizons: Chimney Hill (Hunton), 11,926-81 ft.; first Bromide, topped at 12,831 ft.; second Bromide, topped at 13,033 ft.; and Tulip Creek, topped at 13,129 ft. Drill-stem tests in each zone got substantial gas showings and oil recoveries. Casing has been run to 13,140 ft., above an indicated pay interval in the Tulip Creek, and hole plugged back to 13,158 ft. The discovery well (1 Mainke), originally completed in Bromide sand at 12,855-985 ft., now produces from McLish sand at 13,405-611 ft. It also had assurance of production in the Tulip Creek. Gulf's second well, 1 Mainka-Ring, southwest of the discovery well, failed in the Bromide, but produces from the Hunton lime at 12,120-60 ft.

Gulf also has a prospective new discovery well in southern Lincoln County at its 1 Henthorne, NE NW NE 1-12n-4e. Indicated oil production is in the lower Skinner sand, topped at 4,090 ft. A drill-stem test at 4,090-4,103 ft. got gas at the surface in 11 minutes after the tester was opened, and recovered 2,370 ft. of clean oil and 300 ft. of oil-cut mud in 60 minutes with a flow pressure of 300 psi. Bottom-hole pressure after the well had been shut in 10 minutes was 1,325 psi. Gravity of the oil was 38.5°. Hole is being deepened to its original objective of 5,300 ft. Location is 1 mile southeast of Payson and 2 miles southwest of the South Sparks field.

The same company is confirming the recent discovery of Springer sand production in the North Gotebo area, northern Kiowa County, southwestern Oklahoma, where its 1 Voyles heirs, SE NW NE 2-7n-16w, swabbed 16 bbl. of oil natural in 8 hours. Pay zone now is being given a fracturing application in an effort to improve productivity. Production is from casing perforations at four intervals from 4,032 to 4,074 ft. Total depth is 5,200 ft. The well is the east offset to the discovery well, Stanolind Oil & Gas Co. 1 Kennedy, completed early this year. Gulf already has made location for another well, 2 Voyles heirs, NW SW NE 2-7n-16w, a location southwest of No. 1.

A half mile to the southeast, Stanolind Oil & Gas Co. is testing its 1 Shaffer, NW NW SW 1-7n-16w, with casing perforated opposite the Springer zone at 7,260-68 ft. and 7,276-86 ft. Swabbing is under way, but, as this is written, only load oil has been recovered. A half mile south and a little west of the latter well, Gulf has quit its 1 Haxton, NW NE NE 11-7n-16w, as a dry hole at 5,954 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Cleveland County: V. A. Brill et al. 1 School Land, NE NE NE 16-10n-1e, pumped 20 bbl. of oil from Bartlesville 5,738-60 ft., TD 6,460 ft., PBTD 5,769 ft.

Payne County: Delta Petroleum Corp et al. 1 Rein heirs, SE NE NE 31-19n-2e, flowed 194 bbl. of 45°-gravity oil from Misener 4,653-65 ft., TD 4,930 ft.

OKLAHOMA WILDCAT FAILURES

Atoka County: M. C. Welsch 1 Andrews, SE NE SW 2-1s-12e, dry, TD 805 ft.

Logan County: R. M. Jordan 1 Fraser, SE SE SE 11-15n-1w, dry, TD 6,000 ft.

Vierson & Cochran et al. 1 Terhune, NW SW NW 17-18n-4w, dry, TD 6,249 ft.

Murray County: W. F. Collins 1 Harris, 31-1n-3e, dry, TD 910 ft.

Noble County: Johnson-Sampson 1 Brett, SW SW SE 8-24n-2e, dry, TD 4,226 ft.

Osage County: J. P. Ledford 1 Osage, SE SE NW 14-22n-9e, dry, TD 2,282 ft.

Pawnee County: J. Tom Grimmett 1 Fee-Wootan, NW SE SW 15-23n-5e, dry, TD 3,535 ft.

Payne County: South Texas Development Co. 1 H. F. Jauch, SW SE NE 18-17n-4e, abandoned temporarily, TD 4,420 ft.

Kansas

Stafford County Wildcat Indicates New Oil Pool

BIRMINGHAM & BARTLET and North American Production Co. have a prospective discovery well in the north central part of Stafford County at their 1 Dohrman, NE NE SW 33-22-12, where casing has been run to test promising oil showings obtained in both the Lansing-Kansas City and Arbuckle zones. The location is a half mile south of the Hudson townsite and 2 miles south of the Spangenberg pool.

Best showings were in the Lansing-Kansas City lime, topped at 3,297 ft. (—1,450 ft.), and particularly in intervals at 3,638-53 ft. and 3,485-3,500 ft. A drill-stem test of the former interval recovered 300 ft. of clean oil with a bottom-hole pressure of 500 psi. A previous test of the shallower interval got 60 ft. of clean oil and 90 ft. of oil and gas-cut mud. Total depth is 3,689 ft. in Arbuckle, topped at 3,685 ft. (—1,835 ft.).

Promising oil showings also have been obtained by National Cooperative Refinery Association at its 1 Ginther, NE NE SW 17-11-19, a wildcat 2 miles west of the Solomon pool in northwestern Ellis County. A 3-hour drill-stem test at 3,442-60 ft. in the Lansing-Kansas City lime section, topped at 3,240 ft., recovered 240 ft. of gassy oil with bottom-hole pressure of 1,000 psi. A 60-minute test of a deeper interval at 3,501-17 ft. got 2 ft. of free oil with 8 ft. of oil-cut mud. Hole is being deepened to the Arbuckle.

Stanolind Oil & Gas Co. 1 Christensen, SW SW NW 9-17-11e, 12 miles north of Emporia, in Lyon County, in the northeastern part of the state, recovered 10 ft. of heavily oil-cut mud with 515 ft. of slightly salty water in a 20-minute drill-stem test in a weathered chert zone at 2,779-86 ft. Additional showings were obtained in the Simpson section, topped at 2,930 ft. A 60-minute drill-stem test at 2,933-40 ft. in this zone got 90 ft. of oil-cut mud with a trace of water. Another 60-minute test at 2,955-65 ft. recovered 58 ft. of watery oil-cut mud.

Service Drilling Co. has quit its 1 Beeson, a rank wildcat test in the NE NE NW 8-3-38, Cheyenne County, in the extreme northwestern part of the state, on the southeast edge of the Denver-Julesburg basin. Hole was drilled to 5,392 ft. in Arbuckle, topped at 5,375 ft. Slight showings were obtained in the Lansing section, topped at 4,488 ft. Location is about 10 miles southeast of the Judy area, where Ben Brack recently abandoned his second test.

KANSAS SUCCESSFUL WILDCATS

Barton County: National Cooperative Refining Association 3 McGreevy "A," SE SW SW 33-20s-14w, pumped 99 bbl. oil from Lansing-Kansas City 3,352-64 ft., TD 3,581 ft., PBTD 3,368 ft. (new pay in Bart-Staff pool).

Seward County: Northern Ordnance 1 White, C SW SW 35-34s-32w, flowed 468,000 cu. ft. of gas from Morrow 5,906-10 ft., 6,050-67 ft., TD 6,271 ft.

Sumner County: Herndon Drilling Co. 7 Gurley, SW NW NE 5-35s-1e, pumped 120 bbl. oil from Arbuckle 3,969-93 ft., TD 3,993 ft. (new pay in Guelph pool).

KANSAS WILDCAT FAILURES

Barber County: K&E Drilling Co. 1 Ott,

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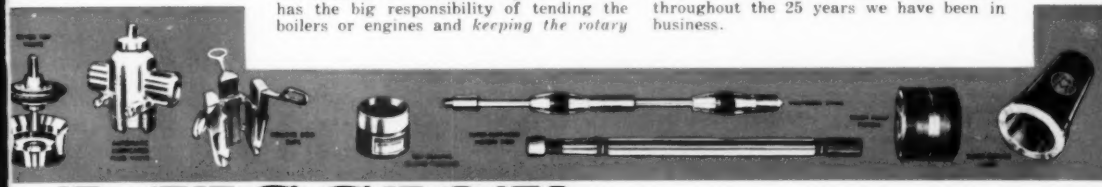

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Butler County: R. J. Wixson 1 Stephens, NW NE SW 35-23s-3e, dry, TD 2,790 ft.
Ellis County: Lindas Oil 1 Hagen, NW NW NE 18-12s-19w, dry, TD 3,969 ft.
Finney County: B&R-National Cooperative 1 O'Brien, SE SE SE 13-21s-34w, dry, TD 4,945 ft.
Gove County: C. E. Skiles - Ikenberry, SE SE NE 12-15s-30w, dry, TD 4,387 ft
Graham County: Empire 1 Muir, NW NW NW 18-6s-25w, dry, TD 4,119 ft.
Taxman 1 Calhoun, SW SW SE 18-8s-21w, dry, TD 3,660 ft.

Rocky Mountain

Staining in Embar Found at Sussex

DENVER.—A development of interest to operators of the Powder River basin of Wyoming was the finding of staining in the Embar at a new-pay discovery in Sussex field. Continental Oil Co. 94 unit, SW SE NW 23-42n-78w, was projected as a Tensleep test in the "B" producing area of this unit, east of the Tensleep discovery in the field. The well made 3,750 ft. of 30.7°-gravity oil on drill-stem test at 8,747-8,818 ft., with Tensleep topped at 8,796 ft. The tool was open 1 hour and flowing pressure was 1,750 psi. with shut in pressure, 4,200 psi.

The important feature in the well was the development of Embar, immediately above Tensleep, and staining through that formation below 8,713 ft. to the top of Tensleep. Tensleep is productive at Meadow Creek, Salt Creek Teapot, and North Fork fields, along the west side of the Powder River basin, but there has been no Embar production in any of these fields. There is considerable production from Embar in other areas of the Rocky Mountains, notably through the Big Horn basin of Wyoming, and possibility of development of that zone through the Powder River basin is of significance.

In Unita basin of Utah, Deep Well Production Co. 1 Lambert, C SW SW 22-8s-16e, in the South Myton area, Duchesne County, made only 20 bbl. of oil daily on test of the zone at 6,240-6,330 ft. The operator has decided to core ahead for additional fractured basal Green River section prior to further tests. This well made 490 ft. of oil and 10 ft. of oil-cut mud on 1-hour drill-stem test of the zone at 6,265-6,314 ft. and was considered commercial from that zone prior to running casing and making additional tests.

Continental Oil Co. has run casing to 3,400 ft. for a test of 2-A unit, NW NW SW 18-12s-25e, a wildcat at Oil Springs, Uintah County, to test minor shows encountered in the well. The well was drilled to 4,170 ft., total depth, and on drill-stem tests at 2,798-3,070 ft. showed some oil but fresh water was recovered on tests.

In the Denver-Julesburg basin, Ohio Oil Co. is swabbing for completion at 1 Cook, SW SW SW 24-15n-48w, southeast of Gurley pool, Cheyenne County. This well is the first to find oil east of the Gurley-Johnson area. On drill-stem test in the "D" sand the well made 2,060 ft. of oil with additional oil and gas-cut mud and gas in 1 hour. The "J" sand made 161 bbl. of fluid, 71 bbl. of which was oil, in 14½ hours on swab test, and tests are continuing. The operator may plug back for completion in the "D" sand.

S. D. Johnson of Wichita Falls, is swabbing at the rate of 11 bbl of oil per hour at 1 Cnockaert, NE NE NW 6-5n-56w, "J" sand discovery in northern Morgan County, Colorado. Production is through casing perforations at 5,862-63 ft. with top of the "J" sand at 5,833 ft. This wildcat has been of interest as the first in this particular area of the basin to find oil, and it will apparently be the third producing field in this county.

Vaughey & Vaughey of Jackson, Mississippi, have cemented casing for completion tests at 1 Goodwin, C SE SE 9-13n-54w, discovery in eastern Kimball County, Nebraska. This well made oil on test of the "J" sand and was drilled to 6,130 ft. total depth, in that formation with casing cemented at total depth. The operators will perforate for further testing on the apparent discovery.

WYOMING SUCCESSFUL WILDCATS

Johnson County, Meadow Creek: Continental Oil Co. 98 Unit, SE NE NW 11-41n-78w, TD 10,726 ft., PB 9,050 ft., flowed 180 bbl. oil per day, (Tensleep discovery new pay), Chugwater 8,079 ft., Embar 8,660 ft., Tensleep 8,910 ft., Madison 9,714 ft., Cambrian 10,115 ft.

West Sussex: Continental Oil Co. 2 Unit, NW NW SE 8-42n-79w, TD 6,016 ft., swabbed 10 bbl. per hour, (Lakota discovery new pay), second Wall Creek 4,965 ft., Mowry 5,035 ft., Muddy 5,655 ft., Dakota 5,812 ft., Lakota 5,876 ft., Morrison 5,955 ft.

COLORADO WILDCAT FAILURES

Morgan County, Southeast Brush: British-American Oil Producing Co. 2 Miller, SE NW SE 28-3n-55w, TD 5,374 ft., dry, Greenhorn 4,876 ft., D sand 5,082 ft., J sand 5,143 ft., base J sand 5,310 ft.

Shell Oil Co. 1 Wade Thompson, NE NE NE 33-6n-60w, TD 6,999 ft., dry, Niobrara 5,827 ft., base Codell 6,123 ft., Muddy 6,516 ft., Dakota 6,596 ft., Lakota 6,878 ft., Morrison 6,940 ft.

Weld County, Alice Nay Block: Husky Oil Co. 1 Keys-Nay, SE SW NW 14-9n-58w, TD 6,291 ft., dry, Muddy 6,193 ft., Dakota 6,280 ft.

Keota area: Bay Petroleum Corp. 1 McKay, SE SE NW 12-9n-62w, TD 7,396

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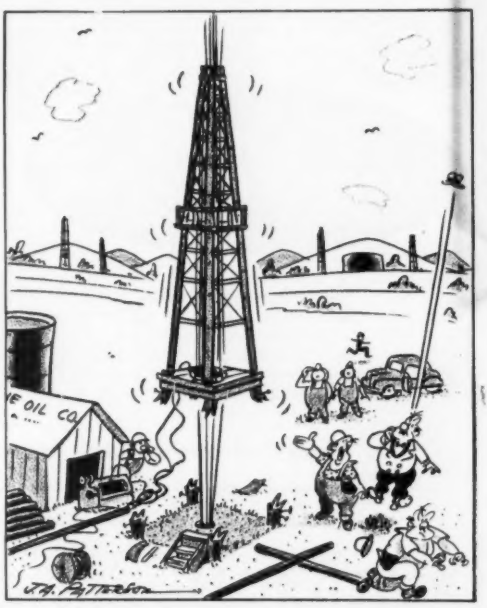

THE OIL AND GAS JOURNAL

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ft., dry. Niobrara 6,477 ft., J sand 7,366 ft.

WESTERN NEBRASKA WILDCAT FAILURE

Kimball County: Carl Brazell et al. 1 Lockwood, NE NE SE 15-14n-53w, TD 5,947 ft., dry. Lakota 5,892 ft.

Central Area

ILLINOIS

A new McClosky lime pool appears to have uncovered in Jasper County where Calvert Drilling, Inc., and Mahutska Oil Co. have run casing for completion tests at their 1 Eberhardt, SE NE NE 21-5n-10e. Good saturation was logged in the McClosky at 2,878-95 ft. A drill-stem test of the interval got gas at the surface in 5 minutes, and, with tester open 60 minutes, recovered 2,220 ft. of clean oil and 60 ft. of oil-cut mud. No water was indicated. Bottom-hole pressure was 1,171 psi. Rotary hole was drilled to 2,936 ft. and casing run through the pay.

The discovery is located just northwest of the townsite of West Liberty, 9 miles north of Olney, and is about a mile east of production in the West Liberty pool.

Wayne Misener Drilling Co. and Anglo-American Cooperative Oil Co. are continuing tests at their 1 Van Dyke, NW NE NE 15-5n-6e, a wildcat discovery well, southeast of Hord, 4 miles west of Bible Grove, in Clay County. The well flowed for several hours natural after casing was perforated at 2,798-2,811 ft. in its prospective Rosiclare pay zone. Since then, the pay has been acidized, and, as this is written, the well is being cleaned. The well also is a prospective producer in McClosky lime at 2,854-62 ft., through which zone casing was run to 2,872 ft. in hole drilled to 2,874 ft. Location is a mile west of the Hord pool.

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INDIANA

Joe Reznik has a new pay zone discovery and extension well for the Parker area, 7 miles northwest of Evansville in eastern Posey County. His 1 Coleman, NW SE SW 35-5s-12w, encountered promising oil showings in both the Aux Vases (new pay zone for the area) and the O'Hara. A 60-minute drill-stem in the Aux Vases at 2,597-2,608 ft., had gas at the surface in 16 minutes and started flowing clean oil (no estimate) in 57 minutes. Total depth is 2,725 ft. with casing run through the pay. Location is a quarter mile from production.

WESTERN KENTUCKY

C. E. O'Neal and associates 1 Moss, 25-0-25, an outpost test for the McKinley area, 3 miles east of Rcbards, Henderson County, near the juncture of the Webster-McLean county line, filled 755 ft. of clean oil and 180 ft. of oil and gas-cut mud without any water in a 2-hour drill-stem test at 2,426-38 ft. in McClosky lime. It had a bottom-hole pressure of 1,025 psi. In the test, gas was at the surface in 9 minutes. Rotary hole was carried to 2,535 ft. after the test and casing run through the pay for completion.

First Benoist sand production for the Pellville pool, Daviess County, has been established by Ed Day and associates at their 1 Tom Payne, SW NE SW 16-P-33, which pumped 24 bbl. of oil per day at completion from that pay at 849-69 ft.

MICHIGAN

Robert W. Devine & J. W. Lang Co. 1 Rollenhagan, SW SW NE 29-9n-14w, Ravenna township wildcat, Muskegon County, was under test in the Traverse at 1,865 ft., total depth, with free oil showing natural. Top of Traverse lime was logged at 1,857 ft. Oil pay was drilled at 1,859-60 ft. and hole carried 220 ft. of free oil natural in 17 hours, and 450 ft. of oil after 64 hours. There was no evidence of water showing. Preparations were being made for acid treatment.

Operators have a sizable lease block in the area, and wildcat was supported by at least one major oil company through an acreage purchase. This outpost well is located just over a mile south of the old Ravenna Berea gas pool and was drilled on the basis of older control points in the general area, one or more of which were reported to have carried untested oil shows in the Traverse.

Tests of new potential Salina oil pays were started this week at Brazos Oil & Gas Co. HE-1 State Chester, C NE NE 15-29n-2w, Chester Township wildcat, Otsego County. A bridge plug was set at 6,585 ft. and section from 6,448-50 ft. was perforated with 48 shots. This opened zone was acidized with 1,000 gal. Tests were in progress. Prior to this new work well had been under test from 6,612-25 ft. after a reacidization with 8,000 gal. and an average recovery after this retreatment of about 15-20 bbl. of oil a day by swabbing. Wildcat was bottomed out in the Niagara at 6,712 ft.

ILLINOIS WILDCAT FAILURES

Fayette County: Homer Luttrell 1 Bernhardt, SW NE SW 26-5n-3e, dry, TD 2,052 ft.

Randolph County: Don Baines 1 Magann, SE SE NW 9-4s-5w, dry, TD 2,309 ft.

Saline County: W. L. Griffith 1 Seton, SE SW SE 1-8s-7e, dry, TD 2,667 ft.

Wabash County: A. M. Fowley 1 Baldwin, NW NW SE 22-1s-14w, dry, TD 2,554 ft.

INDIANA WILDCAT FAILURES

Clark County: Russ Oil Co. and Minerals Corp. 2-B Stewart, SE SW NW 18-1n-10e, dry, TD 1,384 ft.

Knox County: I. F. McCandlish 1 Hess, Military Donation 40-3n-9w, dry, TD 1,590 ft.

Posey County: Inland Producers 1 McFadden, NW NE SW 32-5s-14w, dry, TD 3,116 ft.

R. C. Halbert 1 Wallace et al., SE NE NE 14-4s-12w, dry, TD 2,660 ft.

Sullivan County: Sun Oil Co. 1 Banther-Burns, NW SW SW 28-7n-9w, dry, TD 2,642 ft.

Ottinger-Burgin 1 Creed, NE NW NE 21-7n-10w, dry, TD 930 ft.

Vanderburgh County: Johnston Drilling

Co. 1 Wilbern, SW SW NW 27-4s-10w, dry, TD 2,329 ft.
Johnston Drilling Co. 1 Niederhaus, NE NW NE 21-4s-10w, dry, TD 2,332 ft.
Vigo County: Husky Oil Co. 1 Miller, SE SE SW 13-12n-10w, dry, TD 1,901 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Daviess County: Ed Day et al. 1 Tom Payne, SW NE SW 16-P-33, IP 24 bbl., Benoist 849-69 ft., TD 876 ft. (opens new pay zone Pellville pool).

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: K. R. Ingle 1 Golday, S½ SW SW NW 2-O-26, dry, TD 1,590 ft.
Webster County: Basin Drilling Co. 1 Tapp, W½ NE SW NW 16-N-23, dry, TD 1,408 ft.

MICHIGAN WILDCAT FAILURE

Allegan County, Monterey Township: Ford Oil Co. & Norocho Oil Co. 1 Hansen, NW NW SE 20-3n-13w, Traverse 1,752 ft., dry, TD 1,784 ft.

Southwest Texas

Southwest Texas Reports Several Gas Strikes

CORPUS CHRISTI.—Several gas discoveries highlighted the Southwest Texas news during the week.

In Hidalgo County, The Texas Co. has run potential test at B-1 Mrs. Isabel Y. Yarcia, Anastacio Villarreal Survey, Abstract 43. From casing perforations at 4,323-36 ft., the well flowed 35,000,000 cu. ft. of gas per day on open flow gage. Tubing pressure was 1,750 psi. Well is bottomed at 4,510 ft. with casing cemented at 4,382 ft.

Macdonna Development Co. 1 Berry Packing Co., wildcat 1½ miles southwest of Macdonna, flowed 5,000,000 cu. ft. of gas daily after operator acidized with 3,000 gal. The well is producing from open hole in the Anacacho formation at 1,127-81 ft., and is considered one of the best wells ever drilled in this area that is producing from the Anacacho. The new discovery is located in San Antonio Surburgan Irrigated Farms Subdivision, Block 63.

Bridwell Oil Co. is drilling below 3,600 ft. at 2 Gertrude H. Hoffhines, wildcat 3 miles northwest of Alfred in Jim Wells County, after the venture flowed dry gas on drill-stem test. At total depth of 3,138 ft., with packer set at 3,106 ft., the well developed a working pressure of 250 psi. and flowed an unestimated amount of gas through ¼-in. choke. Tool was open 6 minutes. Bottom-hole pressure registered 1,250 to 1,550 psi.

Curtis Singleton Drilling Co. is completing 1 J. C. Bluntzer estate, gas-condensate prospective discovery in Nueces County. On drill-stem test from 4,830-70 ft., using ¼-in. chokes, well developed 1,150 psi. working pressure in 11 minutes and recovery was 30 ft. of distillate-cut mud and 3 ft. of colored distillate. Side-wall samples indicated gas shows at 5,910, 5,246, 5,185, 5,175, 4,966, 4,842, 2,842, 2,378, and 2,068 ft. Venture is located in Bluntzer Partition, Block 6.

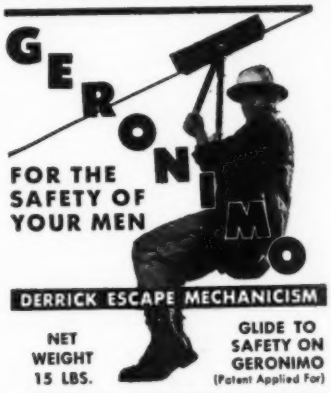
In the Green Branch field area of McMullen County, Phillips Petroleum Co. is drilling below 13,596 ft. at A-1 J. O. Washburn. This unusually deep test for the area, is located in B.S.&F. Survey, Abstract 90, Section 15. Projected depth is 14,400 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Duval County: Oil discovery—Pontiac Refining Co. 1 LeRoy Denman, Realitos Subd., Lot 2, Blk. 14, TD 5,205 ft., Hiawatha 5,050-56 ft., IP 74 bbl. oil per day, 7/64-in. choke, TP 450 psi., 46.2° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: C. W. Jones 1 Guy Holland Smith, I&GN Sur., Sec. 484, A-449, dry, TD 1,730 ft.
Bandera County: Mikton Oil Co. 1 W. F. Stelzer, H. D. Rogers Sur. 312, A-1765, dry, TD 8,515 ft.
Bastrop County: Fred P. Branson 1 W. S. & John Barton, J. Rogers Sur., dry, TD 7,692 ft.
Bexar County: Mark W. Arnold 1 Mrs. Cora Dillon, A. G. May, Blk 216, 16 mi. south of San Antonio, dry, TD 3,800 ft.
Duval County: Southern Minerals Corp. & Taylor Refining Co. 1 Clara Driscoll, Sec. 42, Sweden Farm Lot Subd., dry, TD 4,225 ft.
Hidalgo County: Pontiac Refining Co. 1 Arrowhead Ranch, El Benadito Grant Sec. 24, G. O. Newman Subd., dry, TD 8,504 ft.
Sun Oil Co. 2 D. V. Guerra et al, San Salvador de Tule Grant, dry, TD 8,508 ft.
Jim Hogg County: Panhandle Producing & Refining Co. 1 J. T. Canales, San Antonio Baluarte Grant, Sh. 4, Blk. 21, dry, TD 6,457 ft.
Sun Oil Co. 1 Reuben Holbien, Agua Neuva de Arriba Grant, dry, TD 5,600 ft.
LaSalle County: Kirkwood & Morgan 1 Will Nagy, J. Poitevent Sur. 36, dry, TD 4,256 ft.
Nueces County: Robert L. Siddall 1 Edwin Jurica et al, E. Villareal Rincon del Oso Sur., Sec. 31, dry, TD 5,112 ft.
San Patricio County: Southworth-Austral Oil Exploration Co., Inc., 1 D. I. Coggin, Geo. H. Paul Subd. of Coleman Fulton Pasture Co. Lands, C. F. Delmas Sur. A-140, dry, TD 9,761 ft.
F. P. Zoch, Jr., 1 Lillie Newell, San Patricio de Hibernia Grant, Blk. 6, dry, TD 6,516 ft.
Webb County: Dulaney Oil Co. et al 1 A. M. Bruni est., Sec. 600, 1 mi. south of Aguilares, dry, TD 1,500 ft.
C. G. Mortimer, Jr., et al 1 O. G. Kirkpatrick, CCSD&RGNG Sur. 17, Blk. 1, dry, TD 2,770 ft.
Zapata County: Killiam & Hurd, Inc., et al 1 Trevino, Sur. 624, 22 mi. south of Mirando City, dry, TD 1,953 ft.



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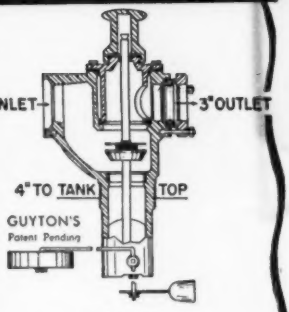

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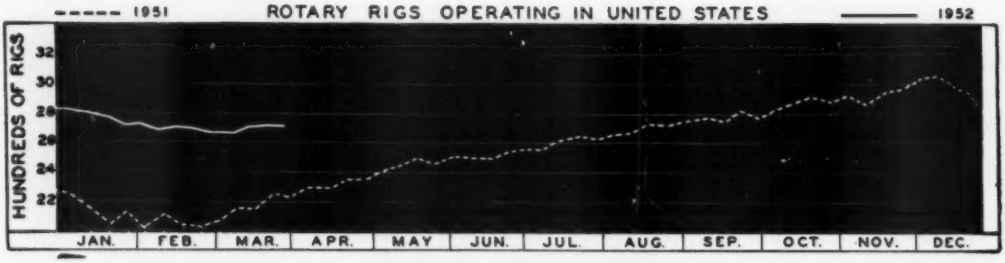
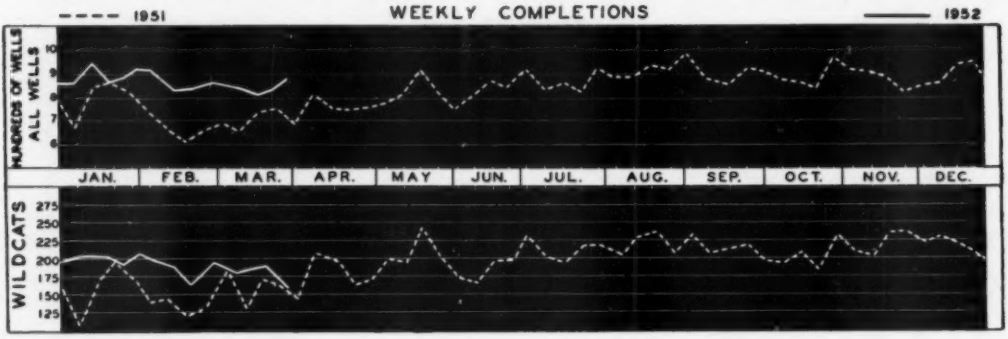
TANK & MFG. CO.
TULSA, OKLAHOMA





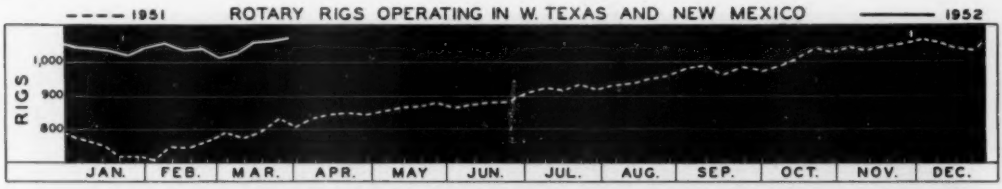
CURRENT STATISTICS

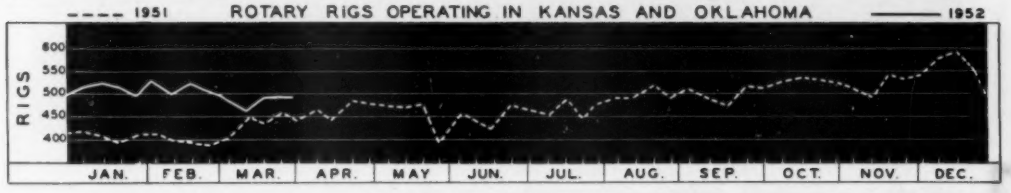
EXPLORATION

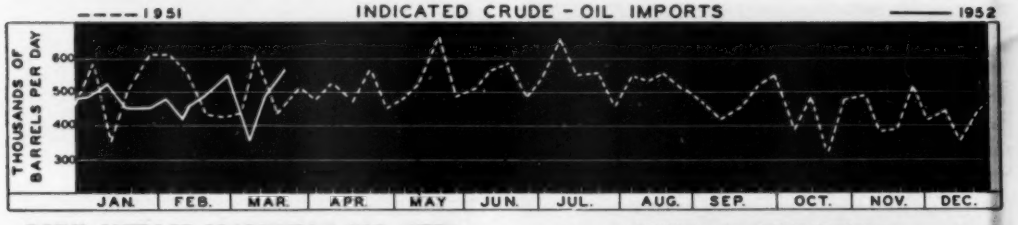
WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 29, 1952

	Total of all wells					Mar. 29		Wildcat completions and discoveries										
													Cumulative total, 1952					
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	20,300	128	30	0	0	0	0	0	0	0	0	0	0
Pennsylvania	36	12	8	†16	74,000	379	190	0	0	0	1	1	0	0	0	2	2
West Virginia	8	1	7	0	23,719	166	145	0	0	1	0	1	0	0	2	1	3
Ohio	11	5	0	6	10,532	208	183	0	0	0	0	0	0	0	1	0	1
Indiana	25	8	1	16	44,725	250	209	1	0	0	2	3	11	0	2	79	92
Kentucky	17	7	0	10	26,778	292	181	0	0	0	9	9	8	0	0	52	60
Illinois	20	11	0	9	53,056	341	381	0	0	0	5	5	5	0	0	77	82
Michigan	12	9	0	3	40,785	152	159	0	0	0	1	1	7	0	1	54	62
Kansas	108	57	7	44	371,152	1,225	964	2	0	1	8	11	25	0	4	191	220
Nebraska	4	1	0	3	19,389	59	75	0	0	0	1	1	2	0	0	32	34
Oklahoma	93	56	3	34	363,136	1,540	1,284	2	0	0	8	10	21	1	6	163	191
Texas	375	242	20	113	1,820,398	4,349	3,826	23	1	5	63	92	198	19	30	930	1,177
N. Central (Dist. 7-B & 9)	125	74	0	51	416,261	1,340	1,129	11	0	0	30	41	116	1	9	401	527
West (Dist. 7-C & 8)	107	95	1	11	646,555	1,353	1,158	6	0	1	9	16	35	0	2	160	197
Panhandle (Dist. 10)	20	9	10	1	60,870	178	176	0	0	1	0	1	1	0	2	15	18
Eastern (Dist. 5 & 6)	19	12	1	6	101,925	218	257	1	0	0	3	4	8	2	0	51	61
Gulf Coast (Dist. 2 & 3)	56	30	7	19	355,671	648	558	4	1	3	5	13	25	10	8	129	172
Southwest (Dist. 1 & 4)	48	22	1	25	239,113	612	548	1	0	0	16	17	13	6	9	174	202
Louisiana	46	31	4	11	316,957	560	483	0	1	1	3	5	10	5	3	59	77
Northern	23	14	4	5	77,732	307	232	0	0	1	1	2	5	0	3	25	33
Southern	23	17	0	6	239,225	253	256	0	1	0	2	3	5	5	0	34	44
Arkansas	9	4	0	5	30,291	90	88	1	0	0	2	3	4	0	0	13	17
Mississippi	6	2	0	4	39,335	104	56	1	0	0	3	4	5	1	1	41	48
Southeastern States	1	0	0	1	7,514	13	12	0	0	0	1	1	1	0	1	7	9
Montana	4	4	0	0	12,683	46	38	0	0	0	0	0	2	0	0	13	15
Wyoming	12	10	0	2	67,240	161	162	2	0	0	0	2	10	0	1	26	37
Colorado-Utah	5	1	0	4	31,684	126	57	0	0	0	4	4	7	0	3	41	51
New Mexico	24	15	7	2	141,025	233	171	1	0	0	1	2	8	0	1	18	27
California	49	42	0	7	216,221	623	471	2	0	0	6	8	29	0	0	111	140
North Dakota	1	1	0	0	8,612	5	0	0	0	0	0	0	1	0	0	2	3
Miscellaneous	0	0	0	0	0	13	10	0	0	0	0	0	0	0	5	2	7
Total United States	880	526	57	297	3,739,532	11,063	9,189	35	2	8	118	163	354	26	61	1,914	2,355
Total previous week	843	440	50	353	3,634,161	.....	.....	29	6	3	150	188	319	24	53	1,796	2,192
Total March 31, 1951	673	367	49	257	2,545,221	.....	.....	26	1	5	108	140	314	19	63	1,563	1,959

Service wells included: *7, †13.





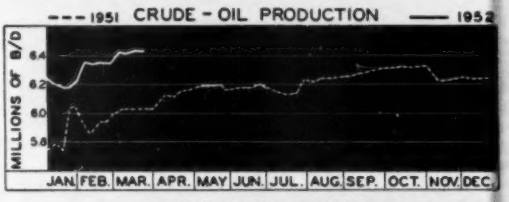


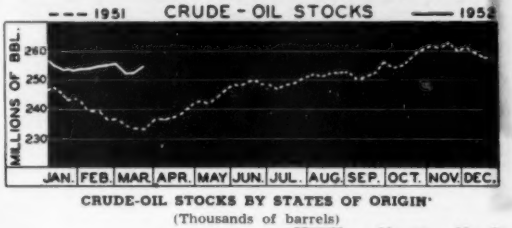
DAILY AVERAGE PRODUCTION FOR WEEK

	March 29, 1952			Mar. 22
	Crude oil	Lease condensate	Total	total
Alabama	2,700		2,700	2,700
Arkansas	76,675	4,525	81,200	81,200
California	978,500		978,500	977,900
Colorado	83,400		83,400	83,200
Eastern	58,000		58,000	57,500
Florida	1,450		1,450	1,725
Illinois	166,300		166,300	163,300
Indiana	30,500		30,500	29,000
Kansas	306,600		306,600	333,350
Kentucky	35,600		35,600	34,900
Louisiana	627,475	44,950	672,425	672,425
North	113,750	14,950	128,700	128,700
South	513,725	30,000	543,725	543,725
Michigan	39,800		39,800	39,200
Mississippi	101,200	4,500	105,700	100,050
Montana	24,000		24,000	24,000
Nebraska	6,000		6,000	6,300
New Mexico	161,600	450	162,050	162,050
Oklahoma	523,100		523,100	523,700
Texas	2,910,375	47,700	2,958,075	2,958,075
Dist. 1	33,500	225	33,725	33,725
Dist. 2	166,575	3,875	170,450	170,450
Dist. 3	473,675	27,000	500,675	500,675
Dist. 4	268,750	4,700	273,450	273,450
Dist. 5	62,350	450	62,800	62,800
Dist. 6	126,850	4,600	131,450	131,450
E Texas field	‡265,000	-	265,000	265,000
Dist. 7-B	88,500	125	88,625	88,625
Dist. 7-C	140,625	5,925	146,550	146,550
Dist. 8	1,041,250	350	1,041,600	1,041,600
Dist. 9	161,175	450	161,625	161,625
Dist. 10	82,125		82,125	82,125
Utah	4,000		4,000	4,200
Wyoming	190,000		190,000	182,500
Total U. S.	6,327,275	102,125	6,429,400	6,437,275
Change from previous week.			down 7,875	
Canada	121,223		131,223	129,350

Total U. S. production January 1-March 29 ..... 562,806,395 bbl.
Same period last year (crude plus cond.) ..... *†530,999,100 bbl.

*Including 7,154,100 bbl. condensate. †Revised.



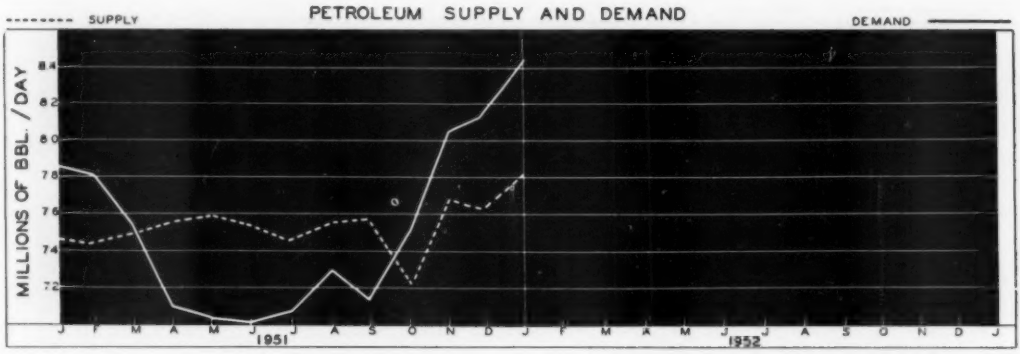


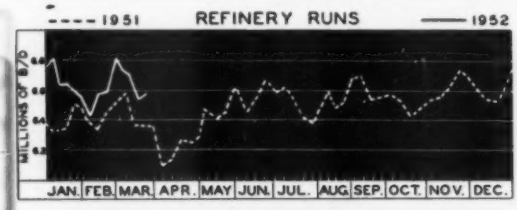
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

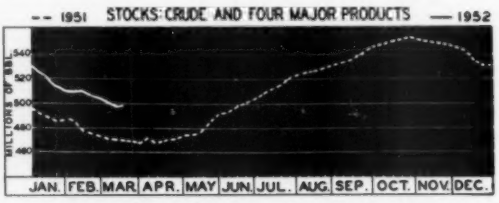
(Thousands of barrels)

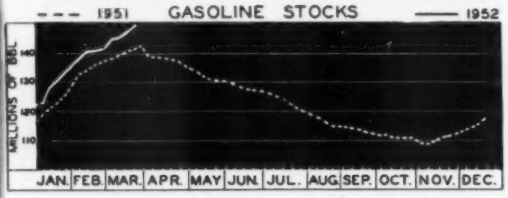
	Mar. 22 1952	Mar. 15 1952	Mar. 24 1951
Pennsylvania Grade	2,156	2,272	2,030
Other Appalachian	2,175	2,000	1,092
Illinois, Indiana, Michigan	11,318	11,581	8,624
Arkansas	2,964	2,940	2,743
Louisiana	13,841	13,922	13,888
North	2,981	2,896	2,938
Gulf	10,860	11,026	10,950
Mississippi	3,523	3,395	2,788
New Mexico	7,720	7,650	7,087
Oklahoma and Kansas	38,763	39,102	37,081
Texas	122,550	120,980	109,308
East Texas proper	11,020	10,449	(†)
West Texas	55,412	54,507	(†)
Texas Gulf	25,673	25,263	(†)
Other Texas	30,445	30,761	(†)
Rocky Mountain	13,964	13,442	12,314
California	50,604	50,385	29,503
Foreign	6,090	5,442	6,374
Total	253,168	253,111	232,832

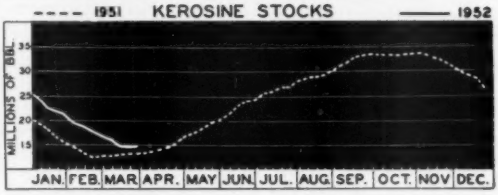
*Bureau of Mines. †Not comparable with current week.

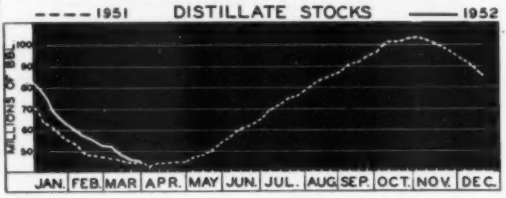


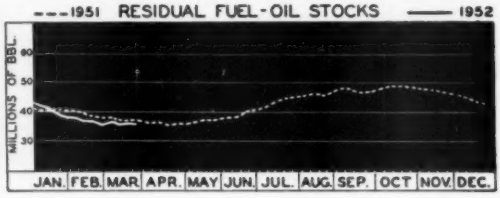










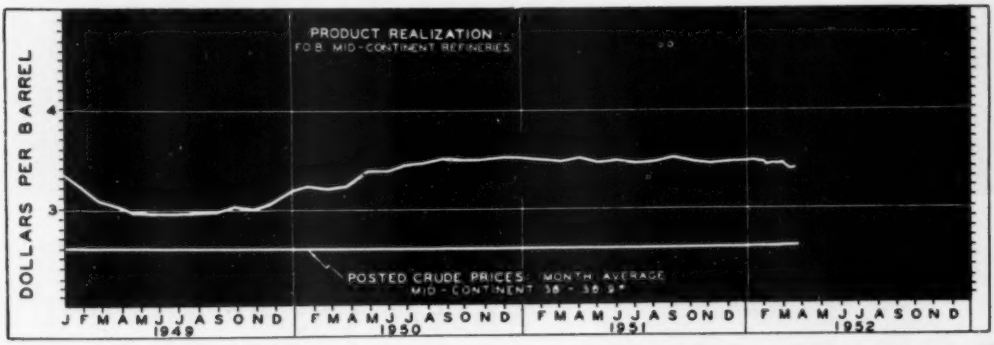


A.P.I. REFINERY REPORT, MARCH 29

(Thousands of barrels

District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, March 1951: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	886	389.6	49.3	218.1	202.0	27,045	5,479	12,524	8,410	1,006	371.6	47.0	245.1	215.6
Appalachian:						3,239	273	476	336	101	40.3	7.0	15.0	13.4
District 1	113	45.6	5.6	16.0	16.1									
District 2	61	30.6	2.6	9.9	18.4	1,441	84	366	137	77	32.8	5.4	10.8	18.2
Ind., Ill., Ky.	1,265	643.1	84.6	220.3	168.3	35,723	3,044	7,620	4,895	1,221	592.5	78.9	226.7	186.3
Okla., Kans., Mo.	528	298.8	19.4	116.0	58.0	18,366	925	6,785	1,255	529	274.0	16.5	126.6	75.1
Inland Texas	232	177.4	13.4	38.1	40.0	5,777	263	979	707	237	149.2	15.4	36.7	45.4
Texas Gulf Coast	1,726	749.6	134.3	430.7	254.7	24,961	2,445	6,581	6,779	1,572	688.2	136.0	364.4	274.3
La. Gulf Coast	495	233.1	62.7	120.7	51.9	8,026	1,102	2,637	1,698	486	226.9	65.2	109.1	63.8
N. La. and Ark.	71	33.7	7.0	14.7	6.4	3,138	593	674	152	68	24.8	7.3	17.6	7.8
Rocky Mountain:														
New Mexico	17	10.6		1.9	3.9	154		54	31	13	7.2	.3	2.5	3.2
Other Rocky Mtn.	225	105.9	7.9	44.1	43.6	6,121	280	1,308	979	222	103.6	7.5	41.2	47.1
California	971	401.6	6.1	156.9	400.4	15,640	230	5,105	10,214	943	396.5	12.6	131.0	377.3
March 29, 1952	6,590	3,119.6	392.9	1,387.4	1,263.7	149,631	14,718	45,109	35,593	6,469	2,907.6	399.1	1,326.7	1,347.5
March 22, 1952	6,542	3,116.9	374.7	1,363.4	1,263.6	147,596	14,598	45,188	36,094	.....	.....	.....	.....	.....
March 31, 1951	6,381	2,914.0	404.0	1,337.9	1,306.7	142,433	13,285	43,170	37,282	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished.



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.38 for week ended March 22, $3.37 for previous week, and $3.49 for March 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of April 2, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10-10¼	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11-11⅜	13.5-13.75	11¾-12
43-44 w.w. kerosine	8¾-9	10-10.1	9
No. 2 straw fuel oil	7¾-8	9-9.25	8
No. 6 residual	$1.35-1.45	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS

South Texas

300 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29
200 vis., No. 3 neutral, 0-10 pp.	16.5-17.5

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
200 vis., No. 3 neutral, 0-10 pp.	16.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

PRODUCT markets in the Mid-Continent have not been very active for the past several weeks, but the few sales that have been reported seem to indicate that there is little possibility of any extended movement of light fuels at the old lows quoted for Group 3. Anyone who can handle a little extra No. 2 fuel is shopping around for a real low price. If he can find a refiner who is crowded and must move some material, the price may be pushed down below 7.5 cents a gallon.

Some distress heavy fuel in the Mid-Continent has been reported sold at $1.25 per barrel for normal northern movement. No new sales for shipment to the Gulf Coast have been reported, but much of the material contracted in January and February included shipments through the summer months.

Summer prices for L.P.G. prevailed in the last half of March on the Group 3 market. The drop in March is often influenced by the fact that many contracts run through the end of the first quarter. Since any purchase in April will count as summer purchases on the new contract, most L.P.G. marketers reduced late March deliveries to a minimum.

Demurrage charges on the pipe line are causing spot sales of gasoline in the line at .125 cent a gallon over the Group 3 low plus pipe-line transportation charges. Normal for this material would be about Group 3 low plus .5 cent a gallon.

Despite the reports of general weakness of inland markets, many suppliers in the Mid-Continent area feel that fuel prices will not drop much lower and that the gasoline market will improve during April.

Products on the East Coast are closely held, not because of the possibility of an over-all shortage of material for the area but due to lack of balance between prices on the Gulf Coast and on the East Coast. It would be foolish for suppliers with products in East Coast tanks to sell them on the spot market at less than delivered cost since the same products may be sold at a slight profit if OPS raises ceilings.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.13
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

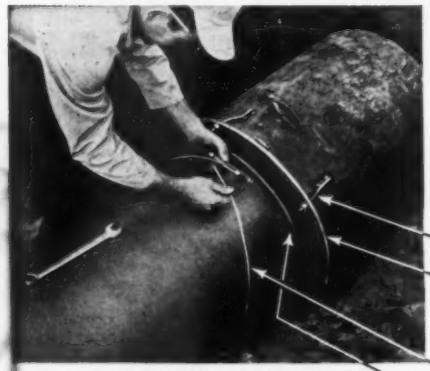
FLAT CRUDE PRICES

Representative posted schedules per barrel.

Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.65
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.63
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

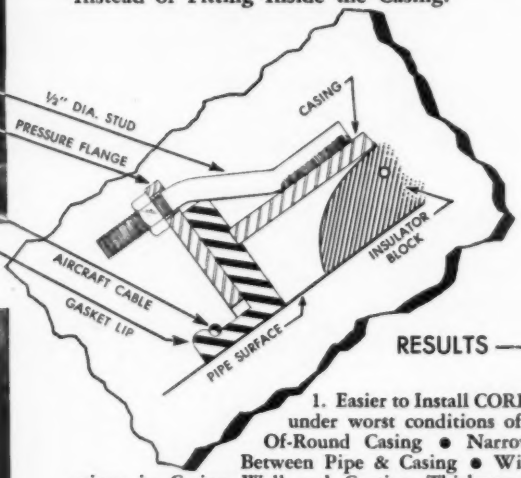
PIPE-LINE TESTED, PROVED and ACCEPTED in '51



Assembling cable with rubber-covered union for clamping gasket lip to pipe.

TYPE "L" WmSEAL CASING BUSHING*

A New Design: It BUTTS Against End of Casing Instead of Fitting Inside the Casing.



THE COMPLETED INSTALLATION
Note that galvanized cable and union are insulated from pressure flange and from pipe.

RESULTS —

1. Easier to Install CORRECTLY under worst conditions of • Out-Of-Round Casing • Narrow Space Between Pipe & Casing • Wide Variations in Casing Wall and Coating Thickness • Mud • Casing ends beveled — by machine or hand torch.
2. WATER-TIGHT Seal with "L" gasket . . . . . .
   - BUTTED AGAINST CASING as pressure flange is tightened on ½" studs welded to casing.
   - TIGHT TO THE PIPE as aircraft cable (4,600# tensile) is tightened to gasket lip. Union is rubber covered to INSULATE galvanized cable assembly from bare casing structure.
3. Always Insulated from the pipe line when a Concentric-Support Insulator is installed just inside casing after the "drag section" is in place.

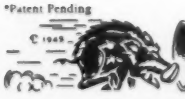
AS STRONG & DEPENDABLE AS THE MEN WHO INSTALL THEM

REPRESENTATIVES

Stuart Steel Protection Corp., Kenilworth, New Jersey | H. E. Davis, Los Angeles 15, Calif. | James S. Kone Co., Amarillo, Texas | Keyes Tank Co., Provo, Utah | Keyes Tank & Supply Co., Casper, Wyoming | Canadian Equipment Sales & Service Co., Ltd., Edmonton, Calgary, Toronto, Canada

WRITE FOR COMPLETE INFORMATION

*Patent Pending



THE PIG WITH THE POKE CLEANS PIPE LINES

T. D. Williamson, Inc.
TULSA 9, OKLAHOMA

EQUIPMENT MEN . . . in the News

Rockwell Names Two New District Sales Managers

C. K. Madison, Southwest regional sales manager of Rockwell Manufacturing Co., has announced the appointments of M. D. Gilbert as Kansas City district sales manager and Roy R. Bush as Tulsa district sales manager.

M. D. GILBERT

ROY R. BUSH

Gilbert became affiliated with the Pittsburgh Meter Co. in 1924 as sales representative for southern Texas. When the company merged and became the Pittsburgh Equitable Meter Division of Rockwell Manufacturing Co., he was assigned to the Houston district office. In 1944 he was promoted to Tulsa district sales manager, a position he held until his recent appointment.

Bush studied engineering at University of Oklahoma and since that time has had 20 years of operational and sales experience in the drilling, production, pipe-line, and refining phases of the petroleum and gas industry. In 1934 he joined the Rockwell sales staff in the Tulsa area. He became special sales representative for the company's Nordstrom Valve Division and in 1951 was appointed sales manager of oil-field products with headquarters in Pittsburgh.

G.S.I. Affiliate Will Serve Canadian Oil Industry

C. M. MOORE

An announcement of interest to the Canadian petroleum industry is the formation of Geophysical Service International Corp., Calgary, Alta., Canada.

The company has taken over all operations of Geophysical Service, Inc., in the Dominion of Canada and will be under the resident direction of Charles M. Moore, Jr., vice president and manager. Supervisory personnel include T. A. Halbrook, E. A. Kiesler, R. H. Rainey, and J. L. Stephens. W. E. Dickson is equipment supervisor and Jack L. Clark continues as office manager.

Geophysical Service International is organized to provide maximum efficiency G.S.I. services in Canada. The company will offer the services of resident personnel, thoroughly experienced with seismic techniques distinctly applicable to Canadian operations, plus the benefits of G.S.I.'s complete research and development programs.

Other officers, located in Dallas, include H. B. Peacock, chairman; Cecil H. Green, president; F. J. Agnich, executive vice president; K. E. Burg and R. C. Dunlap, Jr., vice presidents; J. E. Jonsson, treasurer; and W. C. Edwards, Jr., secretary.

Midwestern Promotes McCray To Oklahoma City Post

J. G. McCRAY

O. E. Murrey, president of Midwestern Engine & Equipment Co., Tulsa, has announced the appointment of Jay G. McCray as general manager of the company's branch office at Oklahoma City. McCray replaces T. E. Mitchell who resigned the post because of poor health. Mitchell, however, will remain partially active within the Midwestern Oklahoma City sales organization.

McCray became shop superintendent at the Midwestern home office in 1948. During his 4 years in Tulsa, he was also active in the Midwestern sales program of Continental Red Seal industrial engines.

Bassett Is Named Director of Sales

H. Y. Bassett, vice president and general manager of the Wolverine Tube Division of Calumet & Hecla Consolidated Copper Co., Detroit, has announced the appointment of George D. Potter, general sales manager, to the position of director of sales.

Replacing Potter as general sales manager is John M. Dumser. Dumser, who came with the Wolverine Tube organization in October 1951, has been serving as assistant to the general sales manager.

W. A. Burns Is Named President, Trailmobile

Champ Carry, president of Pullman, Inc., and chairman of Trailmobile, Inc., has announced that William A. Burns, Jr., has been named president of Trailmobile. Burns, who has been vice president and general sales manager since 1950, assumed his new duties immediately, succeeding George M. Bunker.

Kaiser Steel Makes Webber District Sales Manager

Jack H. Webber has been promoted from sales representative at Tulsa to the position of district sales manager of Kaiser Steel Corp. for the area between the Gulf Coast and Canada and between the Mississippi River and the Rocky Mountains. The company's Houston and Tulsa offices have been consolidated under the direction of the Tulsa office which will continue to be Webber's headquarters.

Ben F. Kelley, Jr., Joins Ben F. Kelley Co., Inc.

BEN F. KELLEY, JR.

Ben F. Kelley, Jr., has joined Ben F. Kelley Co., Inc., Tulsa, as treasurer, according to Ben F. Kelley, president. Kelley attended University of Oklahoma and for the past 10 years has been production superintendent for Colson Oil Co. at Okmulgee.

Kelley is a pioneer designer and manufacturer of spinning line and breakout catheads, hydraulic slips, and other associated oil-industry safety equipment.

Supply Company Moves Midland, Tex., Office

S. J. Iverson, president of Iverson Supply Co., has announced that the company's Midland, Tex., office has been moved to the Midland Building, under the supervision of Henry Oliver, district manager.

(Continued on page 196)

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

UNDISPLAYED CLASSIFIED 15c a word one issue. 10% Discount three or more consecutive issues. $3.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

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$12.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

USED rotary and cable tool drilling tools. E. A. Kelly, Box 861, Oklahoma City. Phone 5-6407.

SALES and Rental of Cable Drilling and Fishing Tools, Casing and Equipment from the Southwest's largest stock of used Cable Tools. Degen Pipe & Supply Co., Tulsa, Oklahoma.

FOR SALE: 300 of 13⅜" OD 8 Round J-55 Casing Couplings, New. 5000 of 8⅝" OD 8-V Line Pipe Couplings, Used. American Pipe & Supply Company, Casper, Wyoming.

FOR SALE AT BARGAIN PRICES

Used Compressors 125 to 320 Hp. Clarks, Worthingtons, National Transits, Bessemers. Can be seen in operation.

Also, two—150 Hp. Fairbanks-Morse Vertical Diesels, new 1948, used only one year.

WALTER J. CLARKE
5565 Wellesley Ave., Pittsburgh 6, Pa.

For Sale
DOUGLAS DC-3
(CONVERTED C-47)

CUSTOM Executive Interior — DIVANS — Private Compartment

Total Hours to February 21, 1952

Airframe	2665
R/H Engine	585
L/H Engine	352

P&W R1830-92 Engines
6477A-0 (Paddle) Propellers

RADIO EQUIPMENT: 2 Bendix MN62 ADFs, 1 each: Bendix RA10 Range Receiver, Bendix MN53 Marker Receiver, RTA1B 50-watt MF Transceiver, ARC 3 VHF Transceiver, ARC Tunable VHF Receiver, Collins 17L Transmitter, Collins 51R2 Omni & Localizer Receiver, Collins 51V Glideslope Receiver.

INCLUDED SPARES: R1830-92 Engine, 6477A-0 Propeller, Miscellaneous Accessories, and Instruments.

For Information, Write

Box E-700
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: Our Sasakwa Gasoline Plant only, "no field lines" now ready for disposal. Inventory and price available upon request. Cities Service Oil Company, Patridge, Bartlesville, Okla.

ROTARY RIG, Wilson Mogul Gardner 7¼x10 Pump, 65 Mast, 38 Kelly, 32 DC., Rotary, Swivel, etc., $16,000. Box E-690, The Oil and Gas Journal, Tulsa, Okla.

for
VALVES • FLANGES • FITTINGS
it's
Newman's Inc.
"One of the Southwest's Leading Distributors"
Tulsa, Okla. P.O. Box 1865 Ph. 25228-LD 635

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 122—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

Good Used 48-L and 36-L Bucyrus-Erie Drill with or without Tools.

Beacon Supply Co.
Box 398, Pampa, Texas Phone 3377

FOR SALE

100,000'—6⅝" O.D. #1—13# L.W. Casing
25,000'—5½" O.D. #1—14# L.W. Casing
200,000'—2⅜" O.D. #1—4# L.W. Tubing

for immediate delivery.
Below O.P.S. Ceiling Prices.

DON ANGLE
Phone 2-1332
2800 West Tusc. Canton, Ohio

26" O.D. NEW STEEL PIPE

Continuous electric weld
.281" wall
Approximately 40 joints 40' each
Immediate shipment subject to prior sale

Write—Wire—Phone

SONKEN-GALAMBA CORPORATION
2nd and Riverview (X-832)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

FOR SALE: Well Drilling Business—71-Star, Modernized #3 Keystone, Both Truck Mounted. Complete Tools, 4 to 20 inch. Physical Inventory $15,000. Nets $6,000 to $8,000 yearly. This is Industrial—No Pipe Worries. Sales Price: $11,000.00. Owner retiring. Write Box E-594, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE 18x7 CLASS ES-1 Ingersoll-Rand Dry Vacuum Pump with K-428 Buda Power Unit complete with V-Belt drive equipment, water tank, scrubber, valves, etc., and mounted on structural steel skids. Operated 60 days. **M. F. McCain, Gliduns-Lane Building, Shreveport, Louisiana.**

IMMEDIATE SHIPMENT
NEW STEEL PIPE & TUBING

Carload and LCL Lots

- **1500 ft. 26" OD x .281 wall, TESTED ELECTRIC WELD PIPE**
  Lengths 15' to 23' 9", ends beveled for welding, 52000# yield, made to spec. API5LX52. Price $6.27 per ft. FOB Chicago, Ill.
- **STEEL PIPE 26" OD x ⅜" wall**
  Welded, 40' lengths, suitable for road crossings or well conductor pipe. FOB Houston, Texas
- **Electric Weld Pipe, P.E. Tested to 300#**
  8⅝" OD x .277-.322 wall
  10¾" OD x .188-.250-.279-.307 wall
  FOB Our Warehouses
- **ELECTRIC WELD PIPE, P.E. A.S.T.M. Spec. A-252-46, Pipe for Piling**
  8⅝" OD x .188-.219 wall
  12¾" OD x .219-.375 wall
  FOB Our Warehouses
- **TAYLOR FORGE Spiralweld Pipe**
  6⅝"-8⅝"-10¾"-12¾" x 10 ga.
  FOB Houston, Pittsburgh, Chicago, New York
- **TESTED Electric Weld TUBING**
  4" OD x 14 ga. FOB Chicago and Pittsburgh

FIRST CLASS USED MATERIAL
BLACK PIPE—Reconditioned
FOB Chicago
100 tons 2" Standard Steel Pipe
125 tons 1¼" Ex. Hvy. Wrought Iron Pipe

• All material subject to prior sale—offered to end users only. In replying, please mention this ad.

L. B. FOSTER CO.
1721 Commerce Bldg. Houston 2, Tex.
231 S. LaSalle St. Chicago 4, Ill.
PITTSBURGH 30, PA. NEW YORK 7, N. Y.

EQUIPMENT FOR SALE

FOR SALE: Westcott, Foxboro and Emco Gas Meters. George R. Milner, Box 124, Okmulgee, Oklahoma.

1 MODEL "K" Cardwell Double Drum Spudder. 145 GK Waukesha Motor. Skid mounted. ¾" Drilling 9/16" Sand Lines. These lines are 4000'. Tools for 7" and 5⅛" Hole. Hand Tools Tubing & Rod Tools Complete. Butane Tank, Steel Dog House. This Rig has Folding floor and Roof. Gaines Drilling Co., Box 547, El Dorado, Kansas. Phone 2317.

FOR SALE

#1—RECONDITIONED USED LINE PIPE

200,000'—6⅝" O.D., .280" wall, 18.97#
300,000'—8⅝" O.D., .322" wall, 28.55#

All 20 to 23' Random Lengths

MECHANICALLY CLEANED AND STRAIGHTENED
IMMEDIATE SHIPMENT
PRICED BELOW CEILING PRICES
SUBJECT TO INSPECTION AND PRIOR SALE

CALL! WRITE! WIRE!

ALERT STEEL COMPANY
3100 E. 87th St. Chicago 17, Ill.
All Phones: Essex 5-2200

EQUIPMENT FOR SALE

FOR SALE: Wilson Giant Draw Works with 2-JL-1335 Buda Motors compounded, motors recently overhauled and in A-1 condition. Total price $7,500.00. Glenn R. Nye Drilling Company, Drawer 30, Telephone 807, Hays, Kansas.

WELL Drilling Rotaries and Spudders, bought and sold. Immediate delivery in most cases. Specify your requirements. Contact Francisco Gonzalez, Baker Export Co., Box 1128, Pecos, Texas.

USED 2" LINE PIPE

We are offering, subject to prior sale, approximately 480,000 feet of 2" 3.75# Line Pipe, located in West Virginia. We are inviting inquiries from dealers, as well as consumers.

Phone 5-9261, Extension 361, or write Box 2171, Tulsa, Oklahoma

FOR SALE

One six hundred barrel red wood tank—One five hundred barrel—One three hundred barrel gun-barrel and two two hundred and fifty barrel tanks and one one hundred barrel. Also have about three thousand feet of two and three inch pipe for sale. Please call P. C. Dressler, McLouth, Kansas.

EQUIPMENT FOR SALE

VALVES: Gate valves from refinery, rising stem 4" each $30, nonrising stem 4" for $25, rising stem 6" each $35, nonrising stem 6" for $30, some other sizes. Also master valves, control heads, pump jacks, upset tubing. Good used equipment. Everything for well service. Pressey & Son, Pueblo, Colo.

7500' OF API Full Hole 4½" Drill Pipe Graded and tested by Sonoscope engineers. Milford Giffin, Giffin Hotel, Tel. 477, Hoisington, Kansas.

1 MODEL RL Cardwell Double Drum Spudder with 145 GK Waukesha Motor mounted on Mud Boat. New wire lines, ⅞" Drilling and 9/16" Sand Lines. These lines are 4500' long. Tools for 7" and 5" holes. All Tubing and Rod Tools complete. Big 6 locker Dog House, Butane Tank and Junk Rack. Junk rack also mud boated. This unit has folding walks and Roofs. Canvas goes around unit to house it in for winter. This Unit is complete as far as hand tools and other tools are concerned. Gaines Drilling Co., Box 547, El Dorado, Kansas. Phone 2317.

FOR SALE: Wilson Giant Drawworks: 2 Buda JL-1335 Motors with chain compound drive. 1—Code Butane Tank. 4000' 4½" Drill Pipe. May be inspected while drilling 4000' wells near Hays, Kansas. Total price $17,000.00. Powell Drilling Company, 306 Derby Bldg., Wichita, Kansas.

FOR SALE: Wilson Giant Rig complete with 2 250 H.P. Cummings Diesel Engines compound; 96 foot Hi Speed Lee C. Moore Mast; 4000 feet nearly new Drill Pipe; 7¼ x 14 Pump, measuring lines, etc., complete ready to drill. Box E-668, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: R. L. Cardwell Double Drum Spudder Type Unit complete with DHK Waukesha Motor, Light Plant, Tools for 4½", 5½", and 7" Casing; Tool House, Butane Tank, etc. $15,000.00. Box E-707, The Oil and Gas Journal, Tulsa, Oklahoma.

BUCYRUS 36L completely overhauled, A1 condition, steel dog house, Kolher, Big Hole tools or may be sold with 5" & 6" tools only—Call or write Big State Tool Co., Odessa, Texas. Pho. 7-3052.

FOR SALE: Number of ZC-118 Fairbanks-Morse Engines. In good condition. Taken from Lease recently electrified. At San Angelo, Texas. Lemay Oil Co., 506 Olive St., St. Louis, Mo. Telephone CHestnut 7888.

FOR SALE at W. C. Norris Plant, Tulsa, 1,813 new 5½" OD 8 Round Thread API J-55 National Tube Seamless Steel Casing Couplings, Price $5.00 ea., all or any portion. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: 6 New 20,000 Gal. Underwriters Steel Storage Tanks, 5/16" plate, welded. 10'6" dia. x 31' long. Located Springfield, Missouri, and Newark, N. J. Owner L. M. Stanhope, Rosemont, Penna.

ALL located Tulsa area and priced to sell: 1350' 10 V thd. 7" 17# and 60' 10", lap weld, ready to run. Like new crank shaft, cylinder & piston assembly (std. bore) for 20 Superior. 9x8 used Ingersoll-Rand cylinder assembly complete. Box E-702, The Oil and Gas Journal, Tulsa, Oklahoma.

USED well drilling equipment. We buy and sell spudders, rotaries, core drills, tools, pipe, blocks, pump jacks, everything for well drilling and service. All used equipment fully reconditioned. Contact us for your requirements and save money. We rent fishing tools. Pressey & Son, Pueblo, Colo.

FOR SALE at Sasakwa Gasoline Plant, 4000', 12¾" OD 33# and 2300', 12" OD 31# plain end line pipe. And at Pampa, Texas, 2500', 12" OD 31# plain end line pipe. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: New Bovaird and Company double eccentric and single eccentric pumping powers at Garnett, Kansas. For price contact A. L. Rhodes, Deep Rock Oil Corporation, Garnett, Kansas, or Joe Huitt, Tulsa.

FOR SALE: 25,000' 2" P.E. line excellent for oil and gas lines, priced way below OPS ceilings. Contact Edco Pipe & Supply Co., 45970, 310 Tuloma Building, Tulsa, Oklahoma.

WELDING FITTINGS AND FLANGES

SPECIAL SAVINGS ON LARGE OVERSTOCK

STD. SEAMLESS L. R. WELD ELLS 90°
2", 2½", 3", 4"

STD. SEAMLESS 45° ELLS
2", 2½", 3", 3½", 4", 5"

STD. CONC. WELD REDUCERS
Sizes 12" and under

STD. WELD CAPS
Sizes 18" and under

STD. WELD TEES

SER. 15 SLIP-ON FLANGES
1", 1¼", 1½", 2", 2½", 3½", 5", 8"

SER. 30 SLIP-ON FLANGES
1", 1¼", 1½", 2½", 3½", 5"

SER. 15 WELD NECK FLANGES
1", 1¼", 1½"

SER. 30 WELD NECK FLANGES
1", 1¼", 1½", 2", 2½", 3", 4", 5", 6", 8"

MANY MORE ITEMS OFFERED ON INQUIRY!!

ACME VALVE & FITTINGS CO.

4914 S. WENTWORTH AVE. CHICAGO 9, ILL.

DISMANTLING GASOLINE PLANT

7—CLARK GAS ENGINE GAS COMPRESSORS

One—230 H.P.—17x18x26x20
One—230 H.P.—17x18x24x20
One—230 H.P.—17x18x24x20
One—200 H.P.—16x7½x10x20
One—165 H.P.—17x6½x16x20
One— 80 H.P.—16x8½x20
One— 80 H.P.—16x7½x20

Complete and in good operating condition.
Full specifications available on request.

PROPANE and BUTANE STORAGE TANKS

TOWERS — VESSELS — PUMPS — BOILERS

INSTRUMENTS — PIPE — VALVES — FITTINGS, Etc.

This plant located near Benton, Illinois, ceased operating a few months ago due to shortage of natural gas.

Write for descriptive folder listing hundreds of other items.

BROWN-STRAUSS CORPORATION

P. O. Box 78
Kansas City 10, Mo.

Norman Strauss
Phone HArrison 1000

Salesman on premises. Contact R. V. Crisp, Phone 1419 or 610, Benton, Ill.

EQUIPMENT FOR SALE

FOR SALE: Good 3½" and 4½" OD Drill pipe. Two EKU Waukesha's, One RL Cardwell, Hercules Engine, Tanks, Treaters, Pumping units. Rogers Pipe & Supply Co., 620 Wright Bldg., Tulsa, Oklahoma.

2200' 6" LAPWELD Casing 19 lb. rackworn, excellent condition. Located in Minnesota. Need 17 lb. 5" casing. A. E. Kief, Montevideo, Minnesota.

STAR DRILLER 71 & Tools, Truck Mtd. Bargain for quick sale. Immediate Del. G. J. Stumpff, Box 1107, Goodyear, Ariz.

FOR SALE

1,000 feet of 8" rubber fabric belt, 4 ply, #1 condition, 75c ft. 2-Wheel 1 ton cargo trailer w/ 7:50 x 20" pneumatic tires, $135.00. Steel Riveted storage tank, ⅛" steel 18' dia. x 12 ft. high, $575.00.

H. L. HARVEY
207 NE 21st St. Ft. Worth, Tex.

FOR RENT — STORAGE SPACE

TANK SPACE AVAILABLE FOR RENT

2—20,000 BBL. TANKS ON R. R. TRACK

GOOD HIGHWAY

CHICAGO SWITCHING DISTRICT
BOX A, LYONS, ILL.

MANUFACTURING FACILITIES

WANTED

Manufacturing Contracts for Heavy Machine Work, Metalizing, Fabricating and Code Welding Steel or Alloys. Engineering and Design Assistance. Good Loading Facilities and Storage Space. Located in Tulsa Area.

Box E-709, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT WANTED

WANTED—Single drum or double drum paraffin scrapping unit. Must be in good condition and reasonable. Box E-708, The Oil and Gas Journal, Tulsa, Oklahoma.

1,400 FEET or less 3½" EUE or 2⅞" EUE drill pipe, new or good used. One 30 foot 4¾" drill collar, new or good used. Have PAD authorization for pipe. Box E-606, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY well drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son. Pueblo, Colorado.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma

WANTED TO BUY: Used Failing 314C or Failing 1500 drill—send price and full description to Box E-672, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

OIL INDUSTRY Employment Service, 405 Tuloma Building, Tulsa, Okla. 4-5074. Tom Robinson, owner. For technical and trained personnel. No fees. Confidential. Now needed: Technical writer. Perhaps physics Graduate best prepared.

HELP WANTED—Experienced landman to head up land department for aggressive integrated independent oil company. Headquarters Houston. Please state age, qualifications and starting salary expected. Address Box E-654, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Refinery Operators. Top opportunity for qualified, high caliber refinery operators willing to travel. Reply giving full particulars of experience and education. Box E-706, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPUTER—College degree and two years of experience as Computer and Observer on seismograph crew. To be given intensive training toward position of Party Chief. Write us giving full details of education and experience and salary expected. Geotechnical Corp., Box 7166, Dallas, Texas

GEOLOGIST to organize, and to direct Geological Department for exploration, and production Div. now being organized, for a well established Natural Gas Co. Must be thoroughly familiar with South Louisiana, and also experienced in North Louisiana, Mississippi and East Texas, and capable of handling the geology in other areas in which the company may want to expand. Salary commensurate with ability and job to be done. Office in New Orleans, Louisiana. Box E-645, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR ENGINEER WANTED!

For middle western natural gas company. Must be qualified to make engineering studies of gas reserves and reservoir performance, interpret and analyze drill stem tests, estimate well production, make pressure surveys and have general knowledge of exploration, drilling and production technique. Salary commensurate with experience and ability. Please write giving full particulars of education, past experience and recent photograph. All replies will be treated with strict confidence.

Box E-705
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

OPPORTUNITIES FOR TECHNICAL REFINERY PERSONNEL for LARGE INTERNATIONAL OIL COMPANY

Entertaining applications of graduate chemical, mechanical, structural and electrical engineers for refinery engineering assignments at home and abroad.

Engineers with refinery experience and also recent graduates will be considered.

Box E-667, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

EXPERIENCED gravity party chief-supervisor for foreign service. Top salary and expense allowance. Family can accompany. Our personnel have been notified. Apply Box E-660, The Oil and Gas Journal, Tulsa, Oklahoma.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-616, The Oil and Gas Journal, Tulsa, Oklahoma.

CABLE TOOL DRILLER: Good steady job for experienced man that can deliver. Bucyrus-Erie 24-L drill, some 6" work, some 9" to 20" pump and ventilation holes—must be straight, run pull and repair 12" and 14" turbine pumps with the drill. Work all daylight, 60 hour week 6 days and the job paid over $7500.00 last year. Good rock drilling with a little shale on top, 250' to 350' holes. Write Judd & Son, Shullsburg, Wisconsin.

ADMINISTRATIVE and field sales personnel. Engineering education and/or background necessary. Knowledge of petroleum and chemical industries desirable. Apply: The J. B. Beaird Company, Inc., P.O. Box 1115, Shreveport, Louisiana.

WANTED: Combination Safety Engineer and Metal Inspector. Southwest Refinery. Box E-681, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED surveyors for foreign service with gravity crews. Top salary, subsistence, travel expenses. Our personnel have knowledge of this ad. Apply Box E-661, The Oil and Gas Journal, Tulsa, Oklahoma.

JOBBER SALES ENGINEER

Integrated oil company in Middle West has excellent opportunity for qualified applicant. Position requires at least three years of sales work, preferably in oil industry. College degree in M. E., C. E., or Physics required. Applicant should have knowledge of machinery and internal combustion engines and be willing to travel. Age 28-35. All replies should contain salary required and recent photograph. Box E-680, The Oil and Gas Journal, Tulsa, Okla.

FOREMEN

PRODUCTION AND CONNECTION

Major company has openings in Venezuela for experienced Production and Connection Foremen. Age 26-40, five years' minimum experience. Working knowledge of Spanish desirable.

WRITE P. O. BOX #35
BOWLING GREEN STATION
NEW YORK 4, NEW YORK

CHIEF DRAFTSMAN WANTED!

For expanding natural gas transmission company. Must be capable of organizing department and supervising all drafting activities including alignment maps, piping, electrical and architectural layout. Salary commensurate with experience and ability. Please write giving full particulars of education, past experience and recent photograph. All replies will be treated with strict confidence.

Box E-704, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

EXPERIENCED seismic personnel interested in domestic or Canadian employment wanted by expanding major contract company. Opportunity for advancement and better-than-average salaries. Box E-673, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE Chemical Engineers and Chemists for positions in Research and Development department, located in Tulsa. State qualifications and salary expected. Write Personnel Department, P.O. Box 381, Tulsa, Oklahoma.

SITUATIONS WANTED

CHEMICAL ENGINEER: B.S., eight years industrial experience in process engineering, economic evaluations, staff assignments. Desires position as technical assistant to executive. Box E-703, The Oil and Gas Journal, Tulsa, Okla.

REFINERY Superintendent, experienced 5,000 to 10,000 bbl. plants, desires connection with independent refinery. Box E-696, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPETENT graduate petroleum engineer with 5½ years' major company experience in drilling, completing, producing, and reworking oil and gas-condensate wells on Gulf Coast and in East Texas, desires responsible position with established independent or consultant. Box E-694, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 1628. Ph. No. 131, Hobbs, New Mexico.

RESERVOIR ENGINEER ten years experience with major oil company in United States and Venezuela. Desires position either domestic or foreign. Broad experience in reservoir engineering, pressure maintenance, secondary recovery and well completions. Familiar with oil field geology. Excellent references. Age 31, married. Available for interview. Box E-701, The Oil and Gas Journal, Tulsa, Oklahoma.

DO YOU need the services of a petroleum engineer? An experienced engineer desires a good retainer fee to begin practice as a consultant. Box E-682, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer with several years production experience, desires job where he can get into reservoir engineering work. Box E-683, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED land man's job, especially qualified for work in West Texas. Also, qualified to handle well completion and production. Box E-684, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC Interpreter - Geologist — Eight years experience desires position with permanent location and opportunity for advancement. Box E-687, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION MANAGER. Petroleum Engineer-Geologist. 38. Experienced land and leasing, negotiating drilling deals and contracts, and management drilling and producing operations in Kansas and Rocky Mountains. Desire responsible connection with active and financially sound operator. Box E-679, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY manager or superintendent—desires connection with progressive independent oil refiner. Eighteen years' experience in construction, operation, and maintenance. Age thirty-eight. Box E-693, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPING Design Draftsman or leader with fifteen years' extensive experience in all departments of Petro-Chemical Plant design. Experience covers flow sheet and plant layout, pressure vessel design, control equipment, estimating, etc. Box E-695, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM Engineer with equivalent degree desires responsible assistant executive, administrative, supervisory position. 27 years experience (exp.) reservoir studies, production, drilling, small refinery, equipment, inventory. Box E-699, The Oil and Gas Journal, Tulsa, Oklahoma.

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REAL ESTATE

WINTERGARDEN IRRIGATED RANCH

An exceptionally good investment; lease it for cash, or operate it; raise two head cattle per acre, year round grazing, or three bales cotton acre plus $1,000 acre winter vegetables. Offering 565 acre irrigated farm in Texas Wintergarden Area, best climate in Texas. Water supply of great worth, four large irrigation wells, excellent water, only 31 feet of lift, INEXPENSIVE IRRIGATION. U.S.G.S. rates water supply one of the best. Soil: alluvial loam, very rich, very deep, recently cleared. Scenic: mile Leona River frontage. Deer, wild hogs, turkey, quail, squirrel, fishing. Borders beautiful Leona Lake. Perpetual springs, good flow now during area's worst drought. Hard surfaced highway, electric power, telephone. A well known traveled university professor in agronomy rates it "best I have ever seen." Farm presently rented $35.00/acre. Selling to settle estate, at $350.00/acre, ½ cash. Buyer can continue to lease, rental will more than make note payments. Minerals intact, not leased, seismic survey now in process by major. Some authorities predict such exceptionally good farm in this area will soon command $1,000/acre. Part owner: Homer I. Henderson, Old Pearsall Road, Uvalde, Texas.

FOR SALE in Odessa, Texas: Nice office building. Fireproof construction. 6,000 square feet. Close in downtown in nice part of town. Suitable for office and/or store for oil or oil service Company. Contact Ray Britton Agency, Odessa, Texas.

LEASE AND DRILLING BLOCKS

FOR SALE: Wyoming Government Land Leases. Natrona County, Twps. 31-32-34-37-38, Rngs. 78-86; Weston County, Twp. 42, Rng. 60; Johnson County, Twp. 41, Rng. 80; Fremont County, Twp. 39, Rng. 92. Active Areas. Write Box 198, Casper, Wyoming.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

DRILLING DEAL—1,200 acres oil and gas leases on tightly held and highly potential Dora structure in eastern Roosevelt County, New Mexico. Also have some leases for straight sale. Information to capable parties upon request. Subject prior sale & confirmation. K. R. French, P. O. Box 238, Portales, New Mexico.

OFFERING approximately six sections Florida grazing land. Fenced—on highway—water holes. Three hundred twenty acres royalty. Native grass. Box E-710, The Oil and Gas Journal, Tulsa, Oklahoma.

10,000 ACRES on gravity high in South Georgia. I can supply gravity survey map on this acreage to party interested in drilling deal or finance a drilling program. The Tuscaloosa sand has been drilled in Georgia with good oil shows. It's producing in Alabama, why not try Georgia? A good deal to use some tax money with excellent chance for shallow oil and gas production. Gas seepage on good structure. T. R. Davis, 700 Mosley St., Vidalia, Georgia.

WANTED: Producing Oil Royalties and Overrides, Large or Small, Any County, Any State, pay you right off. Wire—Write—Call, Jack Eagle, 311 City Nat'l Bldg., Okla. City, Okla. Phone—REgent 6-7027.

UINTAH BASIN: 16,000 acres government leases for sale, adjacent huge Major Co. block. Also offer 640 acres, Montana, 11¢ bbl. settled daily production. 1950 ft. 25 proven locations undrilled. W. H. Smart, 345 Milton Ave., Salt Lake City, Utah.

FOR a limited time NEW CAPITAL for operators or for purchase. If you have production and need new "easy term" working capital to refinance obligations, drill more wells, expand, or desire to sell, contact us for details. In reply don't give details—merely state size of lease, number producing wells, daily pipe line runs and whether prorated. Don't sacrifice before you contact us. Box E-624, The Oil and Gas Journal, Tulsa, Oklahoma.

REAL ESTATE

FOR SALE BY OWNER—Beautifully appointed and furnished estate, with guest houses and caretakers home. All strictly modern. Year round 5 bedroom home. Western cedar construction. 23 acres between 2 lakes, located 1 mile off surfaced hiway, in Chippewa National Forest, center of Minnesota's famous hunting and fishing area. Suitable for small resort or club.

Write—H. M. SCHNOBRICH, Marcell, Minn.

LEASE AND DRILLING BLOCKS

NEW MEXICO Oil and Gas Leases for sale. 2100 Acres, Chaves, Eddy, Roosevelt, Valencia Counties. Box E-651, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Oil and Gas Leases and Drilling propositions in Shallow territory of South Central Kentucky. Logs of wells furnished. W. P. Harley, Bowling Green, Ky.

THREE HUNDRED acres 2 miles from production at Mansville, Okla., also block of acreage in South Bryan County, Okla. Write J. B. Riley, P. O. Box 506, Tishomingo, Oklahoma.

WE invite inquiries from persons interested in Oil and Gas Leases in Southern Alberta, North Central Montana and the Williston Basin. Box E-664, The Oil and Gas Journal, Tulsa, Oklahoma.

THE American Legion, Department of Texas, offers for lease to the highest bidder mineral rights southeast quarter, Section 31, Block A L and SV RR CO. Survey, Reagan County, Texas. Submit bids to Ralph Holman, chairman, board of trustees, the American Legion, Department of Texas, Suite B-1 Commodore Perry Building, Austin, Texas, on or before noon, Wednesday, April 23, 1952. Board of trustees reserves right to cancel all bids. Attest, G. Ward Moody, Adjutant.

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FOR SALE—MAPS

PERMIAN BASIN wildcat map of West Texas & SE New Mexico. Scale 1"—64,000'. April issue now ready. Just like a newspaper—a quick glance and you know what's happening in the Permian Basin. Revised monthly. Single Copy $3.50. Midland Map Company, Box 1211, Midland, Texas.

NEVADA LEASE MAPS

Lease block maps of Elko Co. & White Pine Co. now available. $10.00 each; $18.50 for both maps. Scale 1" = 6 miles. Ownership maps also available. Nevada oil news. Filing information. Geologic consultants. Lease brokers.

UNITED ENGINEERS
252 West 1st St., Reno, Nev., Phone 26394

EQUIPMENT MEN

(Continued from page 191)

Warner Lewis Expanding Tulsa Factory Facilities

A plant-expansion program involving new fabrication equipment and increased shop facilities for Warner Lewis Co. is now under way.

With the added facilities, Warner Lewis is soliciting all types of steel and nonferrous fabrication. For nonferrous and special alloy fabrication, Heliarc welding and Sigma semi-automatic inert gas welding machines are used.

The extra shop space and new equipment will make it possible to handle pressure vessels of all kinds, mixers, kettles, piping, tanks, and small towers.

DonCarlos Represents Wheland in Wichita Falls

The Wheland Co., Chattanooga, Tenn., has announced the appointment of Joe DonCarlos as field representative with headquarters in Wichita Falls. DonCarlos has had long experience with Wheland rotary drilling equipment. For the past 11 years he has been with Jones & Laughlin Supply Co. For 10 of those years he was with the Jones & Laughlin organization in Wichita Falls.

Painter Made Welex Jet Operations Manager

T. W. Painter, formerly supervisor of manufacturing, has been appointed operations manager for Welex Jet Services, Inc. Painter is in charge of operations, which include Arkansas, Oklahoma, Texas, Louisiana, and New Mexico.

Painter spent 10 years with Robert W. Hunt Co., consulting engineering firm in Chicago, and went to Fort Worth in 1947 as comptroller for Texasteel Manufacturing Co. He joined Welex Jet Services, Inc., in August 1950.

Hill, Hubbell Holds Annual Sales Meeting

Hill, Hubbell & Co.'s 1952 annual sales meeting was held recently at Chicago with sales, production, and advertising problems of the pipe-wrapping industry taking top priority in the 3-day conference. Guest of honor was H. L. Jones, president of General Paint Corp. of San Francisco, of which Hill, Hubbell is the eastern pipe-coating and wrapping division. Attending the meeting were: Norman Atchison, Cleveland office supervisor of sales; C. D. Cobbett, Pittsburgh district manager; George Hudock, Chicago district manager; M. M. Bowen, manager of Hill, Hubbell division and vice president of General Paint; H. L. Jones, president of General Paint Corp.; Bryan Patterson, Salt Lake City district manager; R. J. Young, Ridgewood, N. J., district manager; Chuck McGarvey, general plant superintendent; and R. A. McCarthy, Dallas district manager. Hill, Hubbell headquarters are in Cleveland, with three plants located at Lorain and Girard, Ohio, and at Hammond, Ind.

Western Co. Names Gore District Sales Manager

John E. Cooper, vice president and sales manager of The Western Co., oil and gas well acidizing and perforating company with general offices in Midland, Tex., has announced that L. O. Gore has been promoted to sales manager of Western's Panhandle-Western Kansas district.

It was also announced that Wallace McBrayer has been transferred to that district as a sales representative.

In his new position, Gore will maintain his office at the company's district headquarters in Borger, Tex. McBrayer will office in Ulysses, Kans., in connection with Western's field station there.

Gore is one of Western's original employes, and when the company was organized in 1939, he operated one of its first field units. Before being made district sales manager, he was a Western sales representative in Liberal, Kans. He also spent several years in the oil-field supply business and with International Cementers, Inc.

The Panhandle - Western Kansas District was organized by Western 3 years ago. Field stations in the district are located at Borger, Guymon, Okla.; and Ulysses.

Atlas Pipe Buys Brown Pipe & Machinery Facilities

Atlas Pipe, Inc., of Houston, has announced the purchase of the complete pipe yards and facilities of Brown Pipe & Machinery Co., of Corpus Christi.

The new company will be operated under the name of Atlas Pipe, Inc., of Corpus Christi, and will continue to offer extensive pipe-service facilities to oil country and allied industries.

The company will maintain the same personnel and policies established previously by George R. Brown, Jr. Additional improvements and equipment are planned.

Worthington Pump Changes Name to Worthington Corp.

Stockholders of Worthington Pump & Machinery Corp. at their annual meeting reelected their present board of directors and voted to change the company's name to Worthington Corp. "Because of our wide diversifications," said H. C. Ramsey, president, "we believed that the continued reference to 'pumps' in the corporate name tended to lead the public into the conclusion that pump manufacture was our only endeavor."

Ramsey also stated that no corporation policies or practices will be affected in any way by the name change.

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LEGAL

18,549.59 ACRES of Tribal Indian lands located in Townships 4 and 5 South, Ranges 2, 3, and 4 West, USBM, on the Uintah and Ouray Reservation, Utah, are being advertised for oil and gas lease, bids on which will be opened April 17, 1952, at 2:00 P.M., at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

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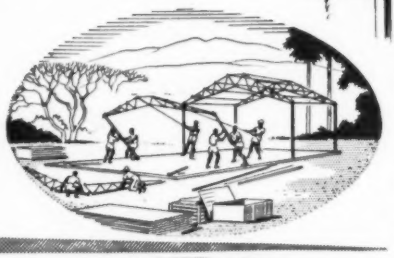
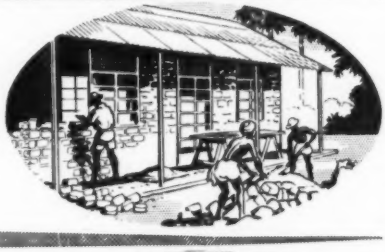
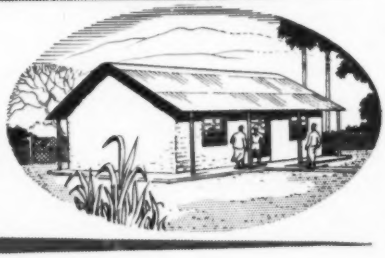


(1) *Here you see an upright of the 'Arcon' framework being raised into position. It takes little more than seven hours for seven unskilled men to assemble a 3-bay unit.*



(2) *Once the roofing is fixed, the walls can be constructed from inexpensive local materials — in this case unfired brick.*



(3) *This is part of the housing programme recently planned for a major oil Company in Persia. The 'Arcon' building is cool, spacious and hygienic, ideally suitable for the purpose.*

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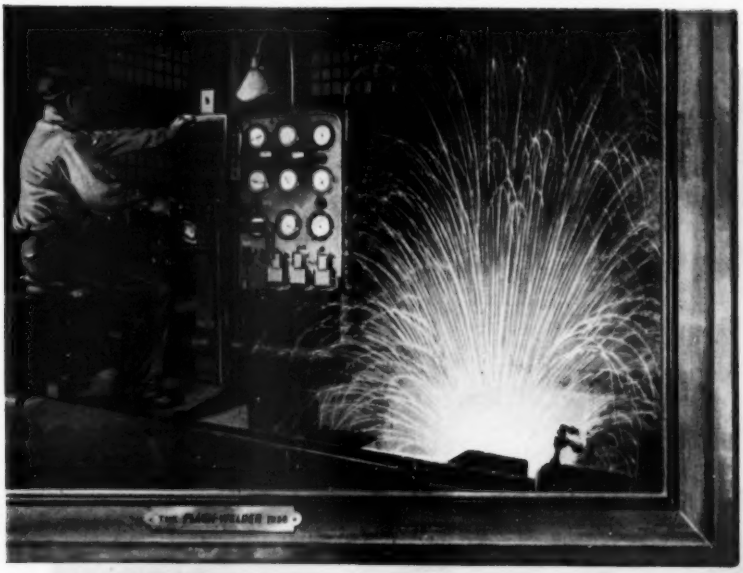

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